The Integrated Master Plan (IMP) and Integrated Master Schedule (IMS) provide a systematic approach to program planning, scheduling, and execution. They provide a tool for improved day-to-day program execution and for improved program/project insight by both government program/project office and contractor personnel. Previously, a number of draft or final IMP/IMS Guides existed at the various centers throughout AFMC. These guides were not always consistent in content and/or application. A mutual understanding of what is required to successfully plan and execute the program is critical to the government-industry team. Also, a great deal of time and resources has been spent getting both the government teams and the offerors/contractors up to speed on how to prepare and use the IMP and the IMS.

To alleviate these problems, the AFMC Acquisition Center for Excellence (AFMC/AE) has developed a single AFMC Guide to:

- Provide a consistent philosophy and approach to the IMP/IMS

- Help create improved IMP/IMS products reflecting a systematic approach

- Be fully tailorable to each program/project's specific needs and permit offerors' to build their IMP/IMS consistent with their own management and scheduling system structure and format

- Improve the learning curve on use of IMP/IMS for both program/project office and industry

- Facilitate development of well-defined and complete plans and schedules for use in day-to-day program execution, thereby decreasing risk and increasing the probability of program success.

- Provides definitions and guidance to support IMS DID DI-MISC-8113B.

This guide is not intended to be the only source of help in preparing the IMP and IMS, or in preparing the IMP/IMS guidance in a Request for Proposal (RFP). At each Product Center and Logistics Center, there is an Acquisition Center of Excellence (ACE) office. Each government program team should contact their local ACE during the early stages of program planning for assistance in IMP/IMS preparation. During a competitive procurement, offerors desiring government assistance may need to forward any requests through the specific Procuring Activity's Contracting Authority. The local ACE offices are listed in **Chapter 5**. Other valuable reference documents are identified in **Attachment 4**.

Chapter 1

PURPOSE

1.1. The Integrated Master Plan (IMP) and Integrated Master Schedule (IMS) are important tools to assist in the planning and scheduling of work efforts. This IMP/IMS Guide outlines an approach to support AFMC program/project teams in their development of effective integrated execution plans and schedules for weapons system/subsystem and component acquisition, modification, and sustainment, and provides a common philosophy and methodology for developing an IMP and IMS. It also provides the benefit of AFMC experience across numerous programs/projects, and, through that experience, seeks to reduce confusion, remove "barriers" to the building of an effective IMP/IMS, and to allow the most efficient use of resources during program planning.

This guide:

- Defines and describes the concept of the IMP and IMS

- Describes several applications of an IMP/IMS

- Provides guidance on development and implementation of the IMP and IMS

- Discusses the importance of tailoring this guidance in Request for Proposals (RFPs)

- Discusses how the IMP and IMS can be used for program execution

- Provides a framework and examples for the IMP and IMS

For contractor-executed programs, the Guide:

- Provides the Government team flexibility for tailoring their RFP's IMP/IMS guidance to the individual program's specific requirements and characteristics.

- Emphasizes the offeror's proposal development and execution should be based on use of the tools and processes they plan to actually use to execute the program, even though the proposal itself may be required in a specific format (e.g., Microsoft Project).

- Emphasizes the use of one single Work Breakdown Structure (WBS) to manage the program. This WBS should line the task within their IMS, IMP, and EVM systems and should reflect the WBS the offeror will actually use to execute the program. The Government should not dictate the program WBS, but refer to MIL-HDBK-881, *Work Breakdown Structure* as guidance

In line with the principle that "a picture is worth a thousand words," the guide provides numerous examples of IMP/IMS "parts" and/or RFP "parts." Some are provided in the basic chapters, and others are found in the Appendices. Most are what we believe to be examples of "goodness"; however, some examples of "badness" have also been included to help illustrate key points. All the examples are intended to facilitate understanding of the IMP/IMS philosophy and methodology.

Throughout this guide, you will also find "Considerations." These are intended to provide advice based on lessons learned both from the government side and the industry side.

Chapter 2

IMP/IMS GENERAL DESCRIPTION

2.1. Overview.

The IMP is an event-based plan. This means it consists of a hierarchy of program events, with each event being supported by specific accomplishments, and each accomplishment having specific criteria to be satisfied for their completion. The IMP should provide sufficient definition to track the step-by-step completion of the required accomplishments for each event and to demonstrate satisfaction of the completion criteria for each accomplishment. The events are not tied to calendar dates; each event is completed when its supporting accomplishments are completed, and this is evidenced by the satisfaction of the criteria supporting each of those accomplishments. This plan, the IMP, is placed on contract and becomes the baseline execution plan for the program/project. Although fairly detailed, the IMP is a relatively top level document in comparison with the IMS (See **Figure 2.1.**).

The IMS flows directly from the IMP and supplements it with additional levels of detail. It contains all of the IMP's events, accomplishments, and criteria; however, it adds the detailed tasks necessary to support the IMP criteria along with each task's duration and its relationships with other tasks. This network of integrated tasks, when tied to the start date (e.g., Contract Award), creates the task and calendar-based schedule that is the IMS. The IMS should be defined to the level of detail necessary for day-to-day execution of the program/project.

The IMS is directly traceable back to the IMP and, in the case of a contracted effort, should also be linked to the program contractor's Work Breakdown Structure (WBS), Statement of Work (SOW)), and Earned Value Management System (EVMS). In this case, both the IMP and the IMS should be consistent with the contractor's management and scheduling system structure and format.

The primary purpose of the IMP and its supporting detailed schedule, the IMS, is for use by the contractor and/or government as the day-to-day tools for executing the program and tracking its program technical and schedule status, including all significant risk mitigation efforts. The IMP and IMS provide an effective method for evaluating the maturity of the program. They are also used by the government in both competitive source selections and sole source negotiations. The proposed IMP and IMS represent the offeror's detailed plan for execution of the program. They are used by the government to evaluate the offeror's understanding of the program requirements and the soundness of their approach as represented by that plan. The IMP and IMS should clearly demonstrate the program is structured to be executable within schedule and cost constraints, and with acceptable risk. Thus, both the IMP and IMS are key ingredients to program planning, proposal preparation, source selection, sole source negotiation and program execution.

A more detailed description of the IMP and IMS are contained within this chapter, while **Chapter 3** will describe in detail the development and implementation of the IMP and IMS.

Figure 2.1. IMP and IMS Relationship.

Integrated Master Plan
(IMP)

- *Event based plan*
- *Contractual vehicle*
- *Relatively top level*

Integrated Master Schedule
(IMS)

- *Task & Calendar based schedule*
- *Level of detail necessary for*
  day -to -day execution
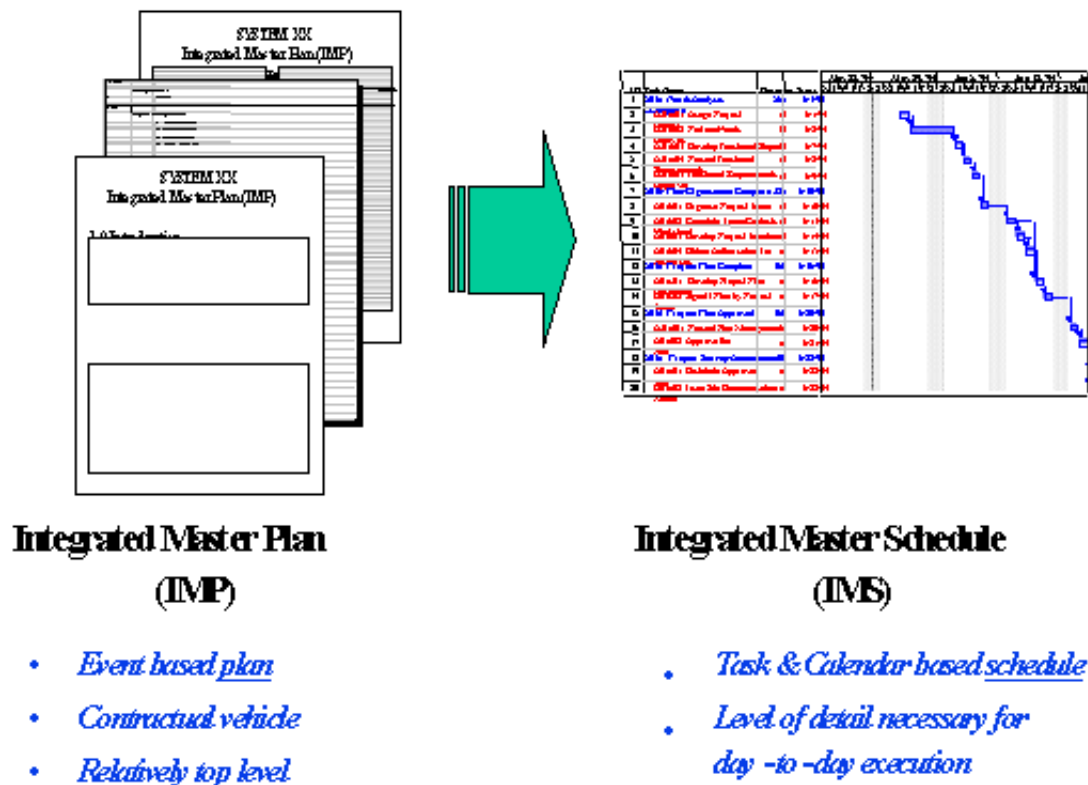
2.1.1. Why IMP and IMS?

The answer is because the Integrated Master Plan (IMP) and Integrated Master Schedule (IMS) are smart business tools that enhance the management of AFMC acquisition, modification, and sustainment programs. They provide a systematic approach to program planning, scheduling, and execution. They are equally applicable to competitive and sole source procurements with industry, as well as government-only in-house efforts. They provide a tool for improved day-to-day program execution and for improved program/project insight by both government program/project office and contractor personnel. They are a tool to help develop and support program/project budgeting, to perform "what-if" exercises, and to identify and assess candidate problem work-arounds. And, finally, the use of the IMP/IMS focuses and strengthens the government/contractor team.

2.1.2. IMP/IMS Benefits

Some of the primary benefits of using the IMP/IMS are addressed below:

Proposal Preparation and Source Selection

During the proposal preparation, the IMP/IMS provides the offeror flexibility in performing their detailed program execution planning, organization, and scheduling, within any existing RFP constraints.

For both the government and the offeror, the IMP/IMS methodology emphasizes <u>real</u> integrated product development and systems integration. All necessary functional disciplines should be contributing at this time and the offeror's IMS product should contain the integrated network formed by all the necessary tasks and their inter-relationships.

The IMP and IMS provide the government evaluation team with the information to help assess each offeror's approach against the RFP's requirements (e.g., Mission Capability, Proposal Risk, Performance Confidence, and Price/Cost evaluation factors). The IMP and IMS should accurately represent the offeror's proposed program approach and that approach should be executable within the cost/schedule/risk constraints.

<u>Contract Award</u>

Normally there will be some form of a Post Award Conference shortly after contract award. At this time the program/project office and contractor team meet to discuss the program, the government and contractor's plans and schedule, and any issues that need to be addressed. This activity serves as the basis for ensuring there is mutual understanding and agreement on the program content, plan, schedule, and risk . The IMP and IMS integrated plans and schedule play a major role in reaching that understanding and agreement.

The IMP and IMS is the contractor's tool for day-to-day program execution. They provide the detailed integrated execution plan and supporting schedule. They identify <u>what</u> has to be done and <u>when</u> it must be done. For those programs with Earned Value Management (EVM) reporting requirements, the IMS should also tie into the EVM system at the work package level. The use of one single WBS for program execution provides the common thread that ties the IMP, IMS and EVMS reporting systems together.

<u>Program Execution</u>

During the actual program execution, the IMP/IMS provides a framework for insight into the contractor's performance for both the program/project office and for the contractor's management team. The IMP/IMS can help the program/project office:

- Identify and assess actual progress versus the planned progress

- Monitor the program critical path and help develop work-arounds to problem areas

- Assess program maturity

- Assess the status of risk management activities based on the inclusion of the program risk mitigation activities in the IMP/IMS

- Provide an objective, quantitative basis for the Contractor Performance Assessment Rating (CPAR) and/or Award Fee

2.2. IMP General Description.

2.2.1. Integrated Master Plan (IMP) Definition.

The IMP is an event-driven program/project plan that provides top-level control and progress management through establishment of key events and associated accomplishments, as well as accomplishment criteria.

The IMP is the plan for executing the program and represents the sequential structure of the program activities. It is an effective tool for both government and contractor management to plan work and assess progress. It can be used to accomplish up front planning and verify commitment, help minimize risk, measure program maturity, and provide management with incremental verification of program progress to support informed program decisions.

The IMP represents the program architecture and contains a hierarchy of the program execution activities. Specifically this hierarchy contains the:

- Events, which are laid out sequentially

- Accomplishments that support each event

- Criteria that substantiate each accomplishment's completion

Although the IMP itself is not tied to the calendar, it forms the basis for the IMS, which contains supporting tasks and their durations, providing a calendar-based schedule. The IMP document normally contains:

- An introduction

- The hierarchy of events, accomplishments, and criteria

- Optional narratives describing critical processes and/or level of effort tasks

- Glossary of terms

A general description of the events, accomplishments, and criteria, and the optional narratives are addressed here; more detail is provided in **paragraph 3.1.4.**.

2.2.2. Events, Accomplishments, and Criteria.

The events, accomplishments and criteria section of the IMP provide a mechanism for planning and evaluating the successful completion of the identified efforts. The IMP should include all the activities and elements associated with development, production, and/or modification and delivery of the total product (e.g., tooling, modification kits, test, support equipment, logistics support, technical manuals, and training requirements).

2.2.2.1. Event Definition.

An event is a program assessment point which occurs at the culmination of significant program activities (accomplishments/criteria)

Events are the foundation of the plan. They represent a logical point at which to assess the program's progress; a window of opportunity to see "how it's going". IMP events should be sequenced in a logical order. They may include major DoD milestone reviews, program design reviews, tests, deliveries, and other key progress demonstration or risk mitigation points. The program/project office may identify a minimum set of required events. These will be provided in the RFP for contractor-executed programs (see **paragraph 3.1.3.**). The offerors then propose these events, as well as any additional events or alternative events based on their proposed execution approach. For a government-executed program, the government team will expand as necessary on the minimum set of required events. For each event, there will normally be two or more accomplishments. Completion of all of these supporting accomplishments constitutes completion of the event.

The term "milestone" is frequently used within the DoD community, and can lead to confusion as to the difference between an "event" and a "milestone". To avoid confusion, the only time the term "milestone(s)" is used within this IMP/IMS Guide is when it specifically refers to a DoD milestone, such as DoD Milestone A. This is not to preclude a DoD milestone being selected as an event.

Consideration: Care should be exercised in selecting the number and level of events we include in the Execution IMP, as it becomes a contractual document, requiring a contract change to modify. To illustrate: one major program recently removed the IMP from contract and discarded the IMS data item entirely, as it had become too burdensome and costly to manage. It turned out that the original Execution IMP placed an extremely large number of events on contract. As the SPO was reduced in size, the IMP and IMS became unmanageable, and the SPO was forced to create a new tool that focused on remaining critical events.

2.2.2.2. Accomplishment Definition

An accomplishment is the desired result(s) prior to or at completion of an event that indicates a level of the program's progress.

As with events, the government may determine a minimum set of required accomplishments. For each accomplishment, there will normally be two or more supporting criteria. Completion of all of the supporting criteria constitutes completion of the accomplishment. Examples of accomplishments might include "Delivery 1 application modules complete" or "COTS and applications software integrated."

2.2.2.3. Criteria Definition

Criteria provide definitive evidence that a specific accomplishment has been completed.

Criteria may include, but are not limited to:

- Completed work efforts (e.g., "All Identified Trade Studies Complete or "Manufacturing Plan Complete").

- Activities to confirm success of meeting technical, schedule, or cost parameters (e.g., Flight Test Report Approved).

- Internal documents which provide results of incremental verification (e.g., Wind Tunnel Test Data Analysis Complete).

- Completion of critical process activities and products required by the offeror's internal program plans or operating instructions (e.g., Risk Management Plan Approved).

Criteria can be either quantitative or qualitative, and should be measurable. For example, "Test plan complete and approved " is a measurable criterion, as well as "Four tests sets delivered". Conversely, "Test plan 85% complete" is difficult to assess, if at all. Stating that 85 percent of the required planning elements are complete isn't useful because the last 15 percent may include the hard-to-do elements that could require more effort than the first 85 percent. We do not recommend placing specification values in the IMP. The following Consideration provides a recommended way to tie specification values to accomplishment criteria.

Consideration: Values of specification requirements, technical performance measures (TPMs), and metrics are not normally placed in criteria in the IMP. However, it is appropriate to have a reference to critical measures in the criteria of the IMP (e.g., Airspeed Key Performance Parameters (KPPs) demonstrated). The completion of internal contractor modeling, simulation, or analysis activities and associated reports used to estimate the value of a critical technical parameter might also be included as criteria.

In some cases in the past, significant resources have been wasted by proceeding into a formal review, demonstration or flight test before the contractor or government team is ready, simply because the "scheduled date" occurs. This was caused by a "schedule driven" philosophy. Keep in mind the IMP is an event driven plan and the event will occur when it is ready to occur, based on the completion of its supporting accomplishments and the criteria supporting those accomplishments.

To avoid the type of problem described above, it might be appropriate to think of criteria as "entry" or "exit" criteria supporting those accomplishments that in turn are supporting resource intensive events, like a major review or a flight test. Entry criteria reflect what must be done to be ready to initiate a review, demonstration, or test. Exit criteria reflect what must be done to "know" that the event has been successfully completed. As noted, this entry/exit criteria case primarily applies to resource intensive events; other events would not normally use them. Examples of entry and exit criteria will be provided in **paragraph 3.1.4.4.**

2.2.3. IMP Narratives.

The IMP may contain a narrative section which gives the offerors an opportunity to provide additional insight into their total work effort and to address how their organization will develop, implement, and commit to the critical processes they will use in executing the IMP to achieve all program goals. Any important activities or outputs related to these processes (e.g., Functional Configuration Audit (FCA)/ Physical Configuration Audit (PCA)) should also be reflected in the IMP. As a whole, the IMP will represent an Integrated Product and Process Development (IPPD) approach that encompasses all deliverable products (e.g., hardware, software, technical data) and the functional disciplines that support the creation and sustainment of those products (e.g., engineering, test, manufacturing, logistics, program management).

Narratives can be used to provide additional information to further the understanding of the execution plan. While there is no constraint on the types of information that can be included in the IMP Narratives, they should not be used to cover material that properly belongs in the Technical/Management Volume of the proposal. The most common narrative types are described as follows:

Process Narratives may be used to facilitate contractor commitment to the use of and government understanding of the proposed critical processes/procedures prior to contract award. These Process Narratives would consist of concise summaries providing visibility into key management and functional processes/procedures, how they relate to the integrated product development process, and an overview of the efforts required to implement them. For example, the government might want a detailed explanation of offeror's risk management or software development processes

Task Narratives may be used to describe the approach to executing those tasks for which there may be no specific IMP accomplishments. For example, the government might want more insight into how

level-of-effort tasks such as configuration management or program control supporting the overall program will be accomplished.

Considerations: There has been a great deal of discussion as to whether Process Narratives should be included in the IMP. Some AFMC Centers discourage their use, while others prefer to include them. Rather than recommend or try to dictate an answer, this guide provides the reader the following "Pros" and "Cons" on the use of Process Narratives:

Pros

- Provides additional insight into the critical processes to be used in executing program

- Provides contractual commitment to the use of the processes (contractor-executed program)

Cons

- Can significantly increase size of the IMP

- As IMP is contractual, change in contractor's processes may necessitate a contract change, which:

- Decreases the contractor's flexibility to make internal process changes

- Inhibits continual process improvement

2.2.4. The Way the IMP Works.

To illustrate how the IMP concept works, we'll use a single event, along with only one of several supporting accomplishments, and only one of several supporting criteria for that accomplishment. The event, accomplishment, and criterion respectively are:

 - First flight of a new aircraft

 - Completion of the First Flight Readiness Review

 - Granting of the SEEK EAGLE flight clearance (for carrying external stores)

In this example (See **Figure 2.2.**), when the SEEK EAGLE flight clearance is granted, that criterion is satisfied. When this criterion is satisfied (along with satisfaction of all the other "entry" criteria that would support holding a First Flight Readiness Review) the review can then be held. When the review is held and satisfies its "exit" criteria, then the First Flight Readiness Review accomplishment supporting the First Flight is complete. When all the other accomplishments (e.g., actually conducting the First Flight) that would normally support a first flight are complete, then the First Flight event is complete.

Figure 2.2. The Way the IMP Works.
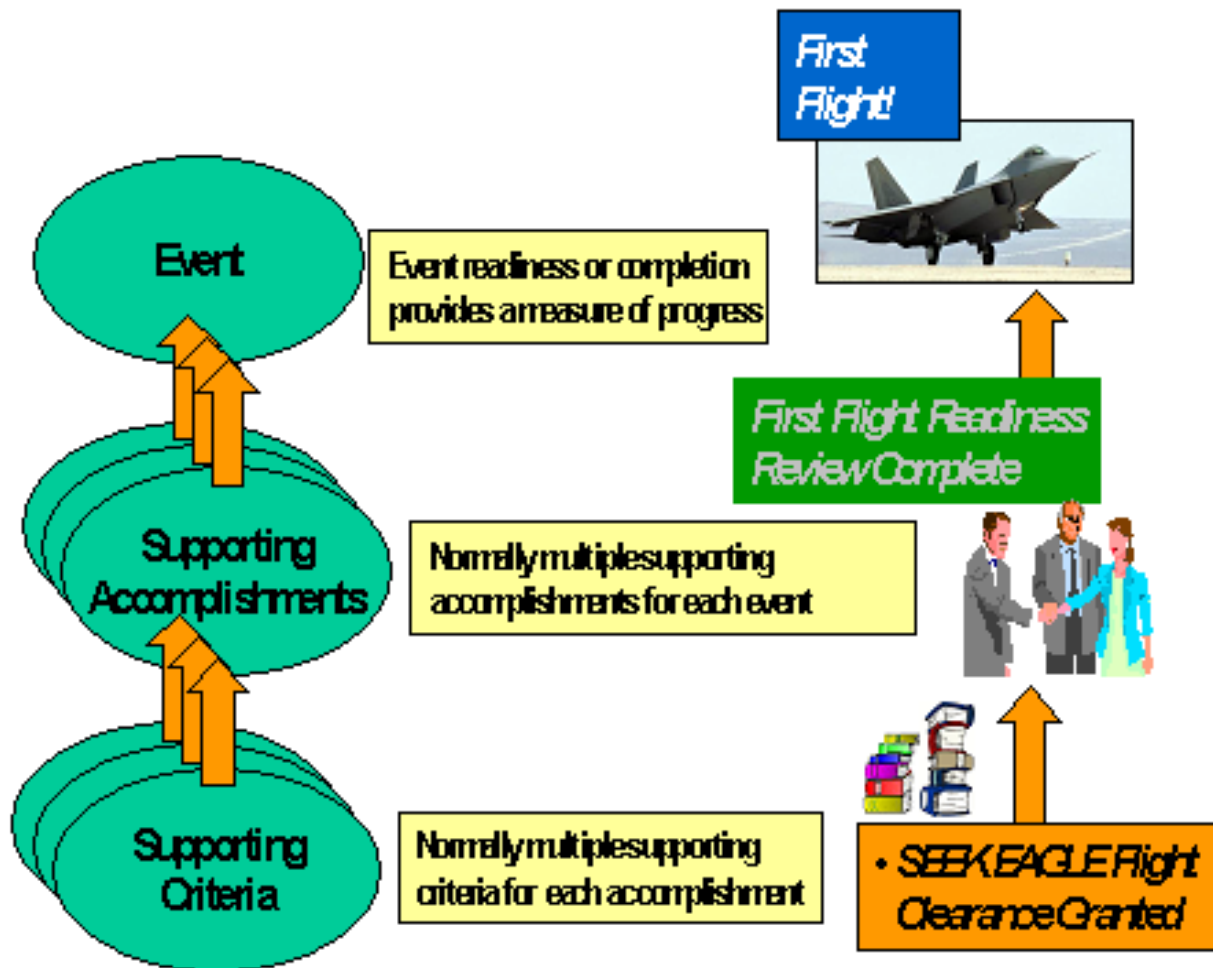
2.3. IMS General Description.

2.3.1. Integrated Master Schedule (IMS) Definitions. The definitions in this section should be used when preparing both proposal and execution IMS. These terms also accompany IMS execution reporting requirements through the Data Item Description (DID), DI-MISC-81183B, Integrated Master Schedule (IMS).

2.3.1.1. Integrated Master Schedule Definition. The IMS is an integrated, master schedule containing the networked, detailed tasks necessary to support the events, accomplishments, and criteria of the IMP. The execution IMS shall contain all of the contract IMP events, accomplishments and criteria from contract award to completion of the contract. The IMS shall be a logical network-based schedule that correlates to the program WBS, and is vertically and horizontally traceable to the cost/schedule reporting instrument used to address variances (such as Cost Performance Report (CPR), Cost/Schedule Status Report (C/SSR), etc.). It shall have a numbering system that provides traceability through the IMP and SOW.

2.3.1.2. Task Definition. A task is a time-phased, detailed activities (where work is accomplished and funds are expended) required to support the IMP criteria and accomplishments.

2.3.1.3. Critical Path Definition. A critical path is the sequence of activities (tasks) in the network that has the longest total duration through the program/project.

2.3.1.4. Periodic Analysis. A written analysis of the program execution status. The level of detail and frequency of reporting will be defined in the DD Form 1423, **Contract Data Requirements List (CDRL)**. **Paragraph 3.2.2.4.** of this guide provides additional information regarding IMS analysis reporting requirements.

2.3.2. IMS Description.

The IMS is an integrated, networked schedule containing all the detailed tasks necessary to support the events, accomplishments and criteria of the IMP. The IMP events, accomplishments and criteria are transferred into the IMS, and the criteria are then expanded by adding the detailed tasks necessary to complete each criterion (See **Figure 2.3.**). As a result, the IMS is directly traceable to the IMP. Durations are entered for each task, along with predecessor/successor relationships, and any constraints that control the start or finish of each task. It should be noted that although durations are only assigned at the task level, these durations will roll up to show the overall duration of any event, accomplishment, or criterion. The result is a fully networked schedule that includes a critical path. Activities along the critical path have zero or negative slack/float. Slack /float is the time available for an activity to be completed before it will impact another successor activity. Therefore, when any critical path task slips, the program completion date slips.

The IMS is tied to calendar through start date (e.g., Contract Award for a contracted effort), the task durations, and task relationships. It becomes the source that depicts the planned dates when each event is expected to occur, as well as all the expected dates for all necessary work to be done to get to the event. **Figure 2.3.** provides an example of this interrelationship. As the IMS captures all the events, accomplishments and criteria of the IMP along with the supporting tasks and their relationships, it becomes the detailed schedule for day-to-day execution of the program/project and, thereby, an effective tool for management of and insight into the progress of the effort. It is used for identification of problem areas during program planning and execution, and to help define priorities for management attention and action, particularly as problem areas are identified. Because actual progress can be compared to the planned progress, the IMS is a key ingredient to providing performance measurement and evaluating remaining work scope and duration.

Figure 2.3. IMP Expanded to IMS.

Activity #	Event Accomplishment Criteria — IMP	WBS REF
E	Event E - Initial Production Complete (IPC)	
E01	Version 1 Kit Production and Delivery Complete	-
E01a	Version 1 Subassemblies Complete	1.1.2.2, 1.2.2
E01b	Version 1 Assembly/Integration/Test Complete	1.1.2.2
E01c	Version 1 Packaging and Delivery Complete	1.1.2.2
E02	Version 1a Kit Production and Delivery Complete (15)	-
E02a	Version 1a Subassemblies Complete	1.1.2.4, 1.2.2
E02b	Version 1a Assembly/Integration/Test Complete	1.1.2.4
E02c	Version 1a Packaging and Delivery Complete	1.1.2.4

- The IMP is Expanded to Incorporate All Detailed Tasks Required to Accomplish the Individual IMP Criteria

- The Tasks are Then Applied Against a Time Line to Develop the IMS

- Tool to Manage Risk

Activity#	Task Name — IMS	2004 Q1	Q2	Q3	Q4
E01	Version 1 Kit Production and Delivery complete				
E01a	Version 1 Subassemblies Complete				
E01a01-1.1.2	Generate bill of material				
E01a02-1.1.2	Generate operation/routing sheets				
E01a03-1.2.2	Order components/subassemblies and raw materia				
E01a04-1.1.2	Receive raw material				
E01a05-1.1.2	Fabricate in-house components/subassemblies				
E01a06-1.1.2	Receive purchased components/subassemblies				

The IMS is normally created using an automated scheduling tool, and the hard copy is often provided in the form of Gantt charts (as depicted in **Figure 2.3.**). The automated tool most commonly used by AFMC and the other Services is Microsoft Project. Therefore, many of the examples in this guide are either generated by or geared to Microsoft Project. However, the principles and philosophy of those examples should apply to any other automated scheduling tool proposed which may be used in the execution of the program.

Consideration: The automated scheduling tool used for the IMS should be useable and understandable for both the government and contractor personnel, both for proposal evaluation and program execution.

2.3.3. The Way the IMS Works

To illustrate how the IMS works, we'll use the same single event, supporting accomplishment, and criterion example as in **paragraph 2.2.4.**, adding four specific tasks that support satisfaction of that criterion. First Flight Complete

- First Flight Readiness Review Complete

- SEEK EAGLE Flight Clearance Granted (for carrying external stores)

- Perform Safety of Flight (SOF) analyses and tests

- Prepare and submit SEEK EAGLE Certification Data

- Validate software and hardware interfaces in the System Integration Lab (SIL)

- SEEK EAGLE Office provide interim flight clearance

In this example (See **Figure 2.4.**), when the four specific tasks are successfully completed, the SEEK EAGLE flight clearance is granted. Similar to before, that criterion then supports the Flight Readiness Review, and the successful completion of that review supports the First Flight event. As cited earlier, the actual IMP and its IMS would have multiple accomplishments supporting the First Flight event; each supported by multiple criteria and each criterion with multiple tasks.

Figure 2.4. The Way the IMS Works.
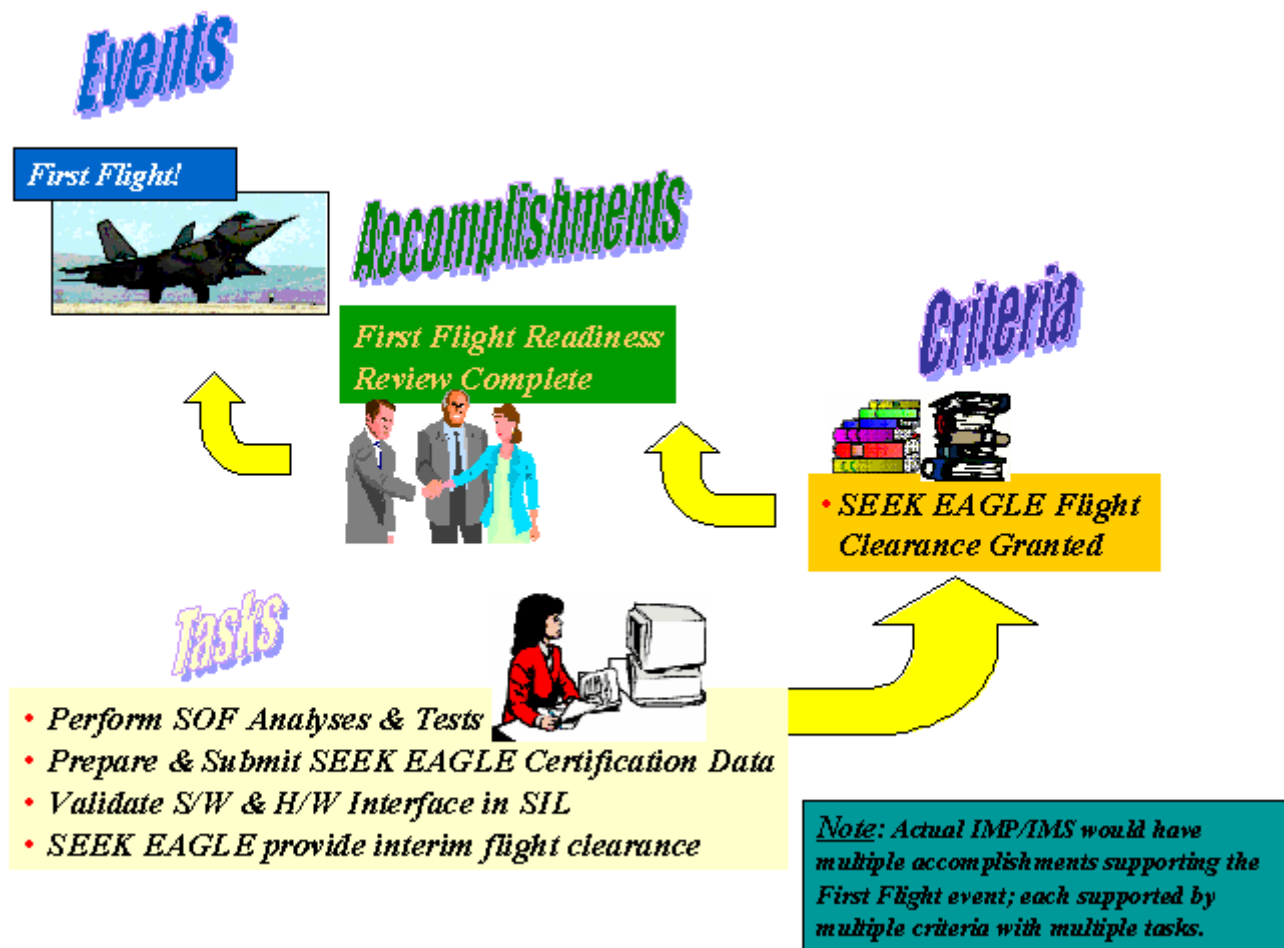
2.4. Single Numbering System.

To establish the relationship of the events, accomplishments, and criteria defined in the IMP and the tasks broken out in the IMS, it is recommended that a logical and traceable numbering system be applied to all elements by assigning each a unique activity number. This single numbering system can also provide traceability to the contractor's WBS (and, thereby, to the SOW, which we recommend be numbered iden-

tically to the WBS) by including the applicable WBS element in the activity number at the task level, where the work is actually accomplished and funds expended. The relationship of events, accomplishments and criteria to WBS can be determined by a roll-up of the their subordinate task relationships. This traceability to the WBS also provides a link between the IMS and the contractor's Earned Value Measurement System (EVMS). **Table 2.1.** provides a generic example of a single numbering system. The activity number for the example circled task would be A02a01-11000; each activity number is unique to a specific task. The 11000 being the WBS reference for that specific task.

Figure 2.5. Single Numbering System.

Event	Accomplishment	Criteria	Task	WBS
(A)	01	a	01-	67000
			02-	64000
		b	01-	13000
			02-	14100
	(02)	(a)	(01-	11000)
			02-	12000
		b	01-	13000
		c	01-	13000
B	01	a	01-	22000

This single numbering system is further illustrated by the specific example seen in **Table 2.1.** For this example, event D is "First Flight Complete" and the first accomplishment is "First Flight Readiness Review Complete". The first criterion for this first accomplishment is "Test Planning Complete", and the first two supporting IMS tasks are "Prepare flight test plans and procedures" and "Submit flight test plans and procedures". We'll also assume that the preparation of test procedures comes under WBS 67000 (System Test & Evaluation) and that submittal of test procedures comes under WBS 64000 (Data Management). In this case we would number the IMP/IMS elements as shown in **Table 2.1.**:

Table 2.1. IMP/IMS Single Numbering System Example.

	Activity #	
Event	D	First Flight Complete
Accomplishment	D01	First Flight Readiness Review Complete
Criterion	D01a	Test Planning Complete
First Task	**D01a01-67000**	Prepare flight test plans and procedures
Second Task	**D01a02-64000**	Submit flight test plans and procedures

As shown above, any criterion can have supporting tasks that relate to multiple WBS elements, so it may only be feasible to add the WBS to the activity number at the task level. Therefore, we recommend adding a WBS Reference column to the IMP Events, Accomplishments, and Criteria table. This enables us to show all the WBS elements related to each criterion by performing a roll-up of each criterion's supporting tasks in the IMS. This roll-up is illustrated in **Table 2.2.** with criterion D01a supporting WBS elements 67000 and 64000.

Table 2.2. IMP Events, Accomplishments and Criteria.

Activity	Event Accomplishment Criteria	WBS Ref
D	First Flight Complete	-
D01	First Flight Readiness Review Complete	-
D01A	Approved Test Procedures Available	67000, 64000

2.5. Application.

2.5.1. General Application. The IMP/IMS tool is applicable to any program/project, in any phase from initial program/project office planning to contract closeout for contracted programs or from initial planning to completion for government-only in-house programs. This flexibility is highlighted in the Specific Applications section below. Use of the tool is independent of the program/project's complexity, size, or cost**.** These factors may, however, affect the required level of detail and amount of tailoring.

2.5.2. Specific Applications.

The IMP and IMS are management planning and execution and progress tracking tools that provide program/project insight, top-level control, and progress management of the detailed tasks necessary to support the program's events, accomplishments, and criteria. They can be applied in numerous

- An over-arching Government Roadmap IMP/IMS

- A Pre-Award IMP/IMS, and

- An Execution IMP/IMS

Following is a basic description of each application. **Chapter 3** will describe the IMP/IMS development and implementation for each application in more detail and provide examples of each.

2.5.2.1. Government Roadmap IMP/IMS.

This is a highly tailored form of the IMP/IMS that is used to create a relatively top level Government Roadmap for your program; this Roadmap should:

- Be prepared by the government program office early in the program planning phase in conjunction with any other supporting or associated government program offices.

- Focus on and convey the "big picture" of the program objectives, capabilities evolution, summary schedule, and any major program constraints. This Roadmap can be used to orient others; e.g., HQ USAF, DoD, Industry, and Congress.

- Support initial and subsequent POM submissions, and provide the basis for developing a sound defense against, or adjusting to, funding cuts or increases throughout the program life.

- Contain key events and show critical schedule interfaces with all supporting programs/activities (e.g., the Services, DARPA, other agencies) and their supporting contracts.

- Be reviewed regularly by your program office and supporting program offices to assess progress toward meeting key events and schedule interfaces; the Roadmap should be updated as necessary.

- Help detect disconnects early, and, hopefully, provide lead time and a planning tool to help "get well".

The Government Roadmap IMP/IMS should integrate and capture the unique and challenging aspects of the program and should serve as the government's overarching management tool to monitor work progression toward the accomplishment of overall program goals and objectives. This Roadmap is particularly critical and useful for programs containing, or interfacing with, multi-government agencies, activities and/or the integration of multiple contracts. The Roadmap should be shared with all government agencies outside the program/project office that might be involved with the program to obtain their inputs as to its adequacy, accuracy, and feasibility. The Roadmap also becomes the framework for the program and IMP/IMS guidelines included in an RFP. Therefore, it is very important to share the Roadmap as early as possible with prospective offerors and contractors. This gives them the opportunity to provide valuable feedback as to program content and schedule feasibility, as well as, to prepare a sound proposed Execution IMP/IMS to support source selection or sole source contracts award.

A generic, very top level Roadmap is provided in **Figure 2.5.** as an example. It shows the top level activities throughout the program from the Initial Capability Document (ICD) through to Final Operating Capability (FOC). This example and its ties to the more detailed execution IMP/IMS of the major contracted efforts supporting the program are discussed in **paragraph 3.1.1.**.

Figure 2.6. Government Roadmap IMP/IMS.
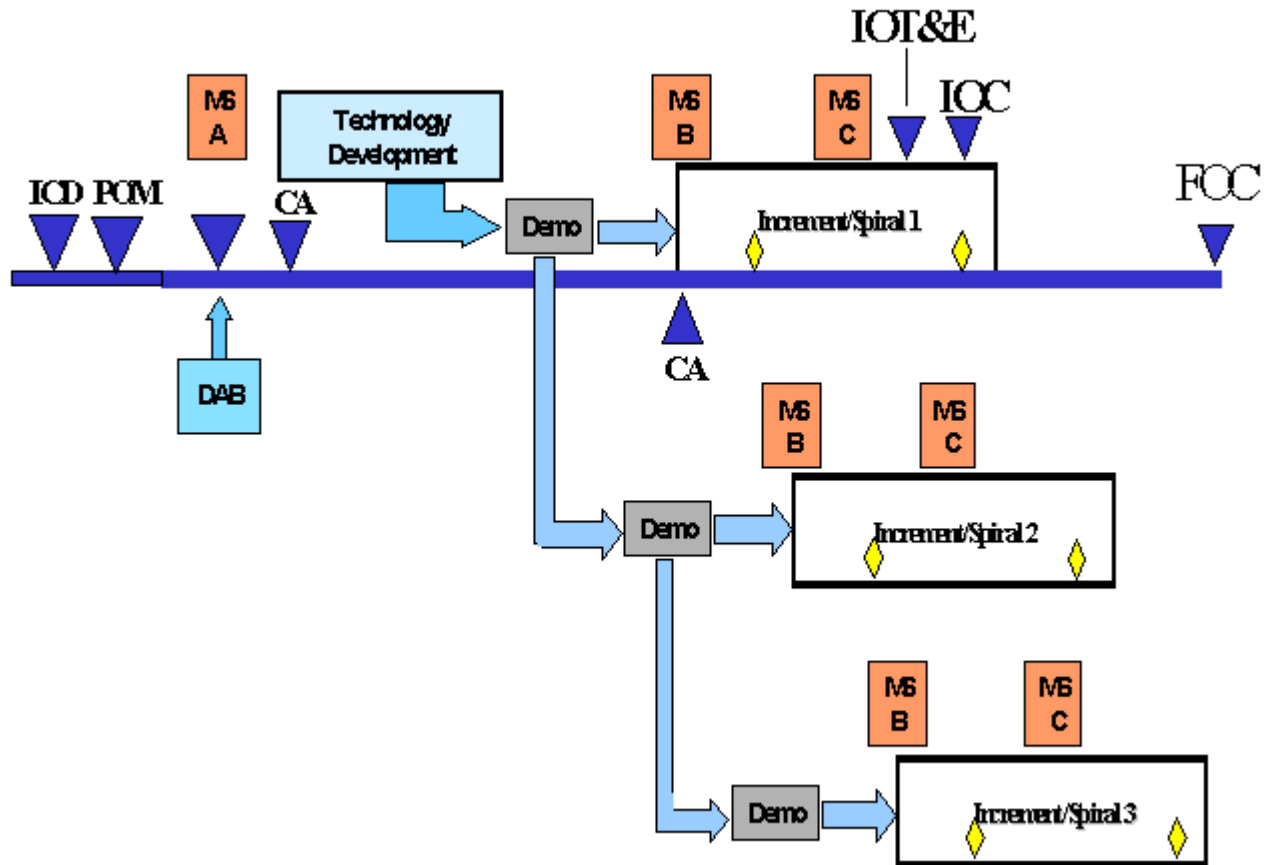
2.5.2.2. Pre-Award IMP/IMS.

The Pre-Award IMP/IMS is a document a program office may use to plan, coordinate, and track the progress of those government and industry activities necessary to achieve contract award. Depending on the acquisition strategy and the complexity of the source determination and contracting, each program office will decide whether or not to prepare a Pre-Award IMP/IMS. However, it can be an extremely useful tool for planning, managing and tracking the pre-award activities with the objective of making an on-schedule contract award.

The Pre-Award IMP/IMS should capture:

- What needs to be done and by when in all functional disciplines to get on contract

- Who has to make it happen (e.g., program office?, ACC?, ESC?, USN?, DARPA?)

- How it fits together to support the contract award and eventual execution

It can help track the progress of all supporting contracting efforts, regardless of their source (e.g., USAF, USN, USMC, DARPA), to support your program. This is important as managing in a multi-agency, multi-program, multi-contract environment is becoming the "norm", rather than the exception. The Pre-Award IMP/IMS can help in cases requiring integration of externally developed/managed/controlled products into the weapon system you are managing. For example, add-

ing the next generation Joint Direct Attack Munitions (JDAM) capability, the associated mission planning capability, and the support equipment to the B-1, B-2 or B-52 weapon system.

See **paragraph 3.1.2.** for an example of a Pre-Award IMP/IMS and further discussion and guidance.

2.5.2.3. Execution IMP/IMS.

The Execution IMP/IMS covers the detailed efforts to successfully execute the program. They capture what needs to be done, how those activities are integrated, and how long it will take to complete them. This application has often been referred to as the "Contract" IMP, but in reality it applies whether the program is to be executed by a contractor or the government itself (e.g., in-house laboratory programs, Air Logistics Center (ALC)-performed modifications, etc). In either case, the same philosophy and methodology apply to the preparation of the IMP/IMS. For each contractor-executed program, the offerors will include the proposed Execution IMP/IMS in their proposal. On a program with many contract efforts, each contract effort would have it's own Execution IMP/IMS for their portion of the total program.

The IMP and IMS can be applied to all types of programs, during any phase of an acquisition, modification, or sustainment effort. As stated above, these tools apply to government programs with no contractual activity as well as during all stages of contracting including pre-RFP, RFP, source selection evaluation, sole source evaluation, program execution, and contract closeout. Application is independent of program complexity, size, or cost, although these factors may affect the level of detail to be included and the amount of tailoring.

See **paragraph 3.1.4.** and **paragraph 3.1.5.** for further discussion and guidance on the development of the Execution IMP/IMS.

2.6. Contractual Relationships. In a contractor-executed program, the proposed execution IMP is normally submitted as part of the Contract Volume and placed on contract at award, becoming the mutually agreed-to "event driven" approach for program execution. Because the IMS is calendar based and goes to a lower level of detail than the IMP, it may be subject to more frequent changes. Therefore, the IMS is normally submitted as part of the Technical Volume, and **should not be placed on contract**. Doing so could trigger a contract change every time a lower level task's content, start date, or completion date changed. The IMS normally becomes a data item, which is regularly updated, either through the Contract Data Requirements List (CDRL), the Data Accession List (DAL), or Electronic Data Interchange (EDI). Further discussion of the IMS as a CDRL can be found in paragraph **3.1.3.2.**

2.7. Integrated Product and Process Development Compatibility. The implementation of the IMP/IMS on a program is an integral part of an Integrated Product and Process Development (IPPD) framework for the work effort to be accomplished. They should be written to align with the Integrated Product Development philosophy wherein the IMP/IMS includes the necessary activities performed by all functional disciplines to produce the product. The IMP and IMS clearly communicate the expectations of the program team and should provide traceability to the Integrated Product Teams (IPTs) managing and executing the program. The IMP/IMS single numbering system described in **paragraph 2.4.** provides traceability to the Work Breakdown Structure (WBS), which defines the products and key processes associated with program accomplishment, and is the basis of IPT-generated cost estimates and cost reporting.

Chapter 3

IMP/IMS DEVELOPMENT AND IMPLEMENTATION

Examples will be provided in this chapter to show how an IMP/IMS could be developed and implemented in different situations. Events, accomplishments, and criteria may vary dependent on the program characteristics but the overriding theme is to use these management tools and tailor them to best serve the specific program. The same principles apply whether the program is an internal government activity, a contracted effort, or an integrated multi-contract activity. Events, accomplishments, and criteria are specifically tied to the program where it is necessary to measure or demonstrate progress before proceeding with follow-on activities

3.1. Development.

3.1.1. Government Roadmap IMP/IMS.

As soon as a planned program or project is identified and assigned to a program/project team, that team should start to prepare their initial Government Roadmap IMP/IMS for the overall effort. They should review all of the program components to identify groups of work effort that signify the various stages of development for the program. These should include work efforts the team controls within their own program, as well as the interfaces/interactions with programs others control that are necessary for success of the program (e.g., a key delivery date of a Navy missile to be integrated on an Air Force aircraft). In many cases, events, interfaces, or transition points between these work efforts have already been identified as checkpoints for external reviews. Whether these reviews are at the Milestone Review with OSD level or Strategic/Tactical Roundtables with a Center's functional experts, they form the initial Government Roadmap IMP/IMS for the near term. The team then tailors the initial Roadmap IMP/IMS to the unique characteristics of the program and lays out the program to achieve "buy in" from all involved government agencies. The Roadmap is normally kept at a fairly high level, particularly prior to contract award(s). As details are refined for future contracted activities, the Roadmap IMP/IMS can be updated to assure the top level critical program events, interfaces, and work activities are represented. Joint service programs may increase the total number of government activities in this total Roadmap IMP/IMS. Many of these activities become progress assessment or demonstration points for higher headquarters and OSD. The Roadmap IMP/IMS will also show how multi-contract and multi-agency activities, such as test activities, external resources, program support, equipment acquisitions, and/or production deliveries will integrate with any directed program demonstration points. Additionally, during the actual program execution all partners must have full access to this information to ensure that planning and scheduling remain current and reasonable.

The Government Roadmap IMP/IMS is often prepared and maintained as a single product in Gantt-type format, showing critical activities and interfaces across the entire program, as well as critical dates that may be dictated by higher authority. **Figure 3.1.** shows one example of a generic Government Roadmap IMP/IMS and two supporting contract execution IMP/IMS. In the example, Contract A represents the Execution IMP/IMS for the weapon system prime contract. Contract B might be a contract through another Procuring Activity within another AFMC Center or within another Service (e.g., Navy) to a subsystem contractor whose equipment will be integrated into the weapon system. The Roadmap IMP/IMS shows how the key events (or activities) of the Execution contracts (A&B) interface with and support each other and interface with and support the completion

of the events of the overarching Roadmap IMP/IMS. The key activities shown in **Figure 3.1.** for Contract B to support that integration would also be reflected in the Contract A Execution IMP/IMS.

Figure 3.1. Government Roadmap IMP/IMS Example.
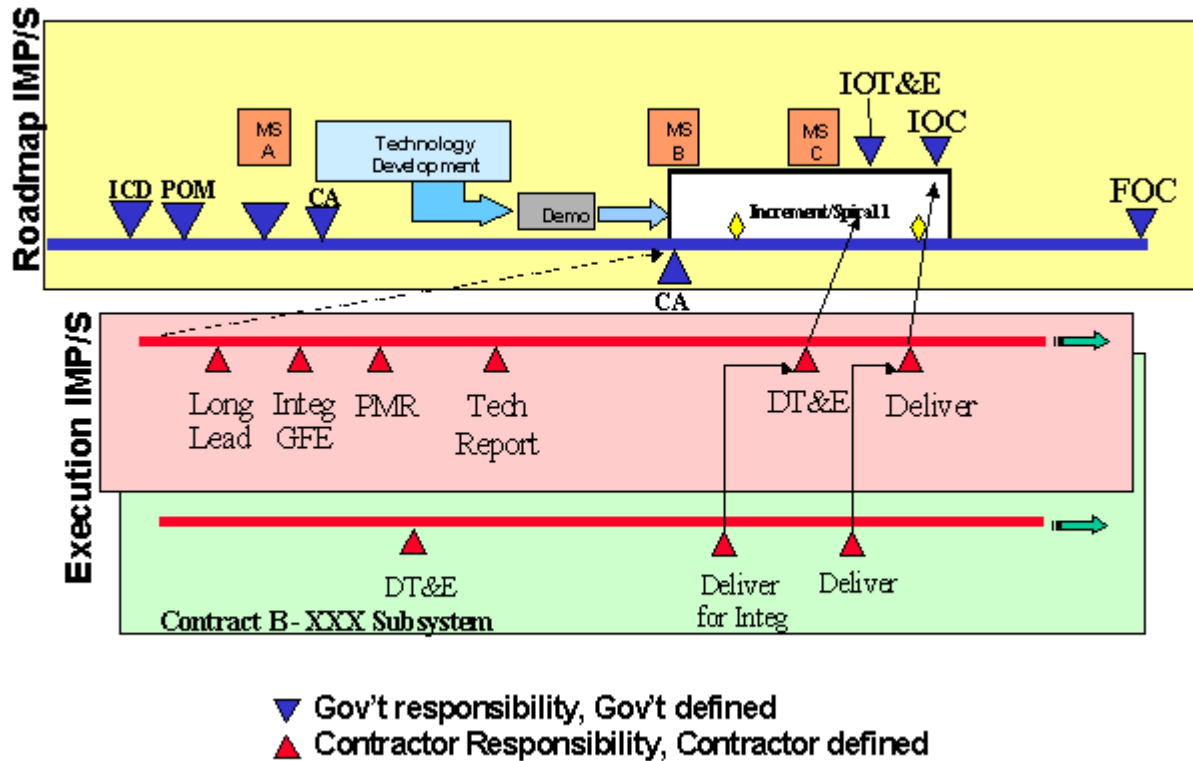
The Government Roadmap IMP/IMS becomes the basis of each Execution IMP/IMS and should be developed as early as possible. It provides a basis for a list of critical events, which will be included in the Section L, Instruction to Offerors, of the RFP (see **paragraph 3.1.3.**). Involving industry as well as the user early and seeking their inputs to the Roadmap IMP/IMS is strongly recommended and will likely influence the development of the final Roadmap IMP/IMS. For competitive procurements, the Roadmap IMP/IMS can be presented at activities such as Industry Days or pre-solicitation conferences to start that involvement. The Procuring Activity should discuss schedule uncertainty and/or impacts of critical directed dates with industry in these meetings before release of the draft RFP (DRFP) and encourage further comment from them in response to the DRFP.

Throughout the life of the program additional situations and information will surface which have associated critical events, accomplishments, and criteria that should be included in the Roadmap (e.g., award of additional contract efforts). The Roadmap IMP/IMS may have to be modified to reflect these. After contract award or in a sole source environment, the government may also decide to expand the Roadmap IMP/IMS to lower levels of detail. In that case, the same principles should be applied as to the Execution IMP/IMS. Independent of the level of detail, it is recommended that some form of change control be placed on the Roadmap IMP/IMS. Additionally, during the actual program execution all partners must have full access to the Roadmap to ensure that planning and scheduling remain current and reasonable.

Consideration: If the Government Roadmap IMP/IMS is expanded to lower levels of detail, caution should be used in duplicating tasks in both the Roadmap IMP/IMS and the Execution IMS, as this provides more opportunity for errors and for disconnects when either one is updated. To avoid this, a good rule of thumb might be to include only key products or progress points from the Execution IMP/IMS in the Roadmap IMP/IMS.

3.1.2. Pre-Award IMP/IMS.

As described earlier in this guide, a Pre-Award IMP/IMS may be used to plan and track the government and industry activities necessary to reach a contract award. For this type of IMP/IMS, it may not be necessary to prepare a separate IMP and IMS. They can both be easily captured in one document or file, a Pre-Award IMP/IMS. **Figure 3.2.** gives an example of a Pre-Award IMP/IMS, based on an ASC example. This particular example follows an Execution IMP/IMS type structure, with activities that could be classified as events (e.g., Contract Award), accomplishments (e.g., Strategy Development Complete, RFP Development Complete), criteria (e.g., Source Selection Plan Complete, Formal RFP Released) and tasks (e.g., Revise DRFP, Prepare Executive Summary letter). The Pre-Award IMP/IMS does not necessarily have to contain all defined levels of an IMS. In some cases, it may be appropriate to assign durations at what may be the criteria level, or even an accomplishment level. The key is to tailor it to your specific application. The local ACE should be able to provide help in the preparation of a Pre-Award IMP/IMS for your program, and may already have templates for your use.

Figure 3.2. Generic Pre-Award IMP/IMS.

ID	Task Name	Durati	Start	Finisl	2001
1	**XXX CONTRACT AWARD**	255 c	1/1/0·	12/21/	
2	**STRATEGY DEVELOPMENT COMPLETE**	173 c	1/1/0·	8/29/C	
55	**RFP DEVELOPMENT COMPLETE**	129 c	1/3/0·	7/2/0·	
56	**Source Selection Plan (SSP) Complete**	37 d	3/7/0·	4/26/C	
62	**Draft RFP Released to Industry**	59 d	3/7/0·	5/28/C	
73	**Formal RFP Released**	28 d	5/24/C	7/2/0·	
74	Review/Respond to Industry Comments On Dra	10 d	5/29/C	6/11/C	
75	Submit Notice of Contract Action (NOCA) to CBC	1 d	5/29/C	5/29/C	
76	Revise DRFP into Final RFP	11 d	5/31/C	6/14/C	
77	Prepare RFP Executive Summary Letter	1 d	6/11/C	6/11/C	
78	Final ISR Start (SYG/PKF/PKC/FMC/JAG final re\	10 d	6/15/C	6/28/C	
79	SAMP Approved	5 d	5/24/C	5/30/C	
80	Integrated Solicitation Review (ISR) Flash Notic(	1 d	6/28/C	6/28/C	
81	SSA Approval of SSP & RFP Release	1 d	6/29/C	6/29/C	
82	Final RFP Release	1 d	7/2/0·	7/2/0·	
83	**MILESTONE DECISION**	117 c	1/3/0·	6/14/C	
95	**SOURCE SELECTION (assume 4 proposals) COMPLI**	107 c	7/16/C	12/11/	
15§	**POST-AWARD DEBRIEFING FUNCTIONS COMPLETE**	10 d	12/10/	12/21/	

3.1.3. RFP Guidance.

3.1.3.1. Overview

This guide provides a general basis for development of an IMP and IMS, and is intended to provide for a somewhat consistent approach. For a government-executed program, the government team can then tailor this guidance to their in-house program, and in a sole sources contract environment, the government-contractor team can work together directly in tailoring the IMP/IMS to the program. However, in a competitive environment, the government must communicate its IMP/IMS requirements to the offerors, so industry can effectively develop the IMP/IMS to reflect both the customer's requirements and their own proposed approach to executing the program. The Procuring Activity should initially communicate their requirements through Industry Days and then include them in the draft and final RFPs (Section L), using this guide as a referenced guidance document, and including any program-unique tailored requirements.

In the acquisition of a new aircraft, where weight usually drives cost and performance, there is an old saying that any new capability or piece of equipment needs to "earn its way onto the aircraft." The same adage should apply to the IMP/IMS requirements placed in Section L of the RFP. The Procuring Activity should minimize the number of additional requirements for the IMP/IMS. There are several reasons for this:

One of the early acquisition reform initiatives was to have the contractor/offeror write the SOW, as opposed to having the government provide it. This reform initiative was based on the tenet that the customer should be telling the offerors "what it needs" rather than "how to build it." It also pro-

vided the offerors the ability to tailor the SOW to their individual approach and their specific risks. At the same time, it provided the government with an excellent tool to evaluate each offeror's understanding of the problem and soundness of approach in the source selection process. The same tenet applies to the IMP/IMS.

In today's environment, the offeror's usually have limited resources (personnel and money) to apply to building a competitive proposal. It is in the best interest of the government to have those limited resources focused on building a solid execution plan, and not applied to meeting a large set of supplementary requirements that have little marginal value to the end product. For example, one government RFP placed twenty-three (23) "additional requirements/constraints for the IMP/IMS" in Section L. Many of these constraints conflicted with each other, and the industry teams spent considerable labor hours trying to meet them, only to find that the government was violating a number of these constraints in its own internal scheduling and planning.

Often, what seems to be only a small change or an "easy to do" requirement can require expenditure of a disproportionate number of hours by the offerors to meet it. For example, one final RFP changed a required "text field" in the IMS from what had been in all of the prior draft versions of the RFP. The offeror had already built over a hundred special IMS sorting filters based on the previously required text field, and had to manually change every one.

There should be no need to duplicate the information in this guide. Simply reference the guide and make it available to the offerors. Then use the RFP Section L to provide the supplemental requirements and guidance to tailor the IMP/IMS for a specific program. Also, it is recommended that the contractor be encouraged to propose the systems they use to plan and manage. The proposed WBS structure should also reflect the contractor's method for managing program funding.

Consideration: Offerors should also review Section B (Supplies or Services and Price/Costs), Section F (Deliveries or Performance), and the CDRL (DD Fm 1423), as they will often provide supplemental requirements to be considered in the development of the IMP/IMS.

3.1.3.2. Specific RFP Guidance. The following are specific areas where supplemental guidance may be needed:

 - **Minimum Required Activities** - The government should provide a list of any minimum required activities they want addressed in the IMP/IMS. These may be events, accomplishments, or criteria, and may be derived from the Government Roadmap IMP/IMS, user operational requirements, or internal program/project office requirements. For example, the Roadmap IMP/IMS may have events for Operational Test & Evaluation (OT&E) and Initial Operational Capability (IOC), which would be appropriate events for the Execution IMP/IMS. Another example would be a user's Capabilities Development Document (CDD) (formerly the Operational Requirements Document (ORD)) or Statement of Objectives (SOO) which might define criteria for a "Site Activation." These criteria could be provided for inclusion in the IMP/IMS. Finally, the program office may desire a " First Flight Test Readiness Review (TRR)," and include this requirement in the RFP. In this case, the offeror could decide to include the TRR as an event, or perhaps as an accomplishment, supporting an event for "First Flight."

- **Date Constraints** – Although the IMP is an event-driven plan, there may be some "hard date" constraints in the Government Roadmap IMP/IMS that have to be carried into the Execution IMS,

such as a directed IOC date. These should be provided either in the RFP, the RFP library as part of the Government Roadmap IMP/IMS, or should be provided during Industry Day/Pre-Solicitation conferences.

- Page/Line Limits – It is recommended that page or line limits not be placed on the IMP and IMS (use of page limits for IMP Process Narratives is discussed separately below). The reasons for this are as follows:

 - The offerors should be allowed to build the IMP and IMS to the level of detail they feel is necessary to describe and manage their plans for the day-to-day execution of the program.

 - Ideally, the offeror would use the same detailed tasks for both the IMS and the "basis of estimate" (BOE) in the cost volume. If the contractor needs to understand all of the day-to-day activities and tasks to properly estimate the program, then those activities are appropriate for inclusion in the IMP/IMS.

 - Line limits in the IMS can drive the offeror to summarize tasks to a higher level. However, most of the interrelationships in an IMS are at the detailed task level. When summarizing to a higher level, the result is often an artificial (and inaccurate) task relationship. For example, one RFP with line limits resulted in an IMP/IMS from the winning offeror where the durations and relationships were assigned no lower than the criteria level, and in some cases were assigned at the accomplishment level. This can adversely impact the credibility of a schedule risk analysis, particularly a statistical risk analysis (see **paragraph 3.1.5.6.** for a discussion of schedule risk analysis). In addition, detailed tasks then had to be added to the IMS after contract award.

 - Summarizing tasks at a higher level often results in numerous "long duration" tasks. At the same time, many RFPs ask for a rationale for each "long duration" task. In the example cited above, the IMS contained two (2) pages of these tasks, each one citing the line limit as the rationale. These added 2 pages added no value to the understanding of the IMS.

 - Many "non-value added hours can be spent by the offeror trying to "force-fit" an IMP/IMS into an artificial page/line limit

Consideration: Some RFPs have asked for a "Summary" IMP/IMS, often in conjunction with line limits, which can preclude the development of a complete execution plan. Generally, the use of a "Summary" IMS is not recommended for the same reasons given for line/page limits.

Source Selection Evaluation teams have expressed concern over the potential submittal of an excessively large IMS, which would be very hard to evaluate in a timely manner. If the Procuring Activity thinks this is a potential problem, they might consider a statement like the following example:

"The objective is for the offeror to show understanding of requirements for the XXX program and a plan to successfully execute the program. In this vein, the offeror may submit such data as appropriate, with the caution of not overburdening the evaluation team. In particular, do not offer repetitive sets of activities at a low level of detail for multiple activities (e.g., multiple site activations, multiple production lots)."

- Program-Unique Characteristics/Requirements – the RFP should address any unique aspects or interrelationships of the program that may affect the IMP/IMS. For example, if the software for

an aircraft subsystem (e.g., a missile) being developed must be delivered in time to support integration of the aircraft Operational Flight Program (OFP), that information should be provided, along with a schedule for the aircraft OFP. Another example would be modification kits that must be delivered to an ALC to support specific aircraft going through Programmed Depot Maintenance (PDM). Again, this type information should be included in the RFP.

- IMP Narrative Requirements – If the government desires IMP Narratives, the RFP should specifically state what types of narratives are desired. For Process Narratives, the RFP should identify any specific processes that the government requires as a minimum set to be addressed. The RFP should also describe any particular content required in the narratives (e.g., company standard process designation). It is recommended that "contractor format" be allowed for the narratives. **paragraph 3.1.4.5.** provides further guidance for the preparation of the narratives.

- Page Limits for IMP Narratives – If narratives are desired in the IMP, a page limit may be desired.

Consideration: If an IMP narrative page limit is imposed, the government team should ensure that the limit is consistent with the requested information. For example, one government RFP levied a page limit of twenty (20) pages for the entire IMP, and at the same time provided the following guidance for the IMP Narratives:

"Each narrative subject area shall be arranged in the following format: A. Objective; B. Identification of Governing Documentation; and C. Process (if applicable). The Objective is a brief statement of desired results, and is to be traceable to the SOO. The Governing Documentation lists the Government documents and/or offeror practices or procedures to be used to achieve the objective. The offeror shall clearly state whether Government documents will be tailored further and reference in which of the offeror's compliance documentation they will be tailored. The narrative shall be consistent with applicable technical and management approaches described in the Mission Capability volume of the proposal.

a. The offeror shall include the following specific areas of Government interest with narratives in the IMP (not listed in order of importance):

(1) Specialty Engineering Disciplines, (e.g., R&M, System Safety, Human Engineering, etc.)

(2) Integrated Logistics Support, including but not limited to training, tech order publications, and NDI/COTS utilization and support

(3) Configuration Management Planning and Transition Configuration Management Planning

(4) Software development plan that identifies:

(i) Integration between systems engineering processes and software development processes.

(ii) Assurance of software quality.

(iii) DT&E and OT&E planning, including completion of the Verification Cross Reference Matrix and participation in DT&E/IOT&E

(iv) Development change control planning

(v) Planning for reduction of life cycle costs

(5) System Integration

(6) Risk Management

(7) Potential approaches for accelerating the production schedule. Included as part of this discussion should be a list of long-lead items. ROM estimates should accompany this information to support Government FY02 funding decisions and should be provided as part of the Cost/Pricing information.

 b. Additionally, the offeror shall consider the following when preparing the IMP:

(1) Failure and Deficiency Reporting, Analysis, and Corrective Action.

(2) Government-Furnished Property Utilization.

(3) System Security Engineering Management Planning.

(4) System Safety/Health Risk Engineering, Environmental and Hazardous Materials Management, and Hazard Status Reporting.

(5) Quality program planning.

(6) Planning for handling deviations and waivers.

(7) Planning for information data exchange with Government.

(8) Planning for subcontractor and associate contractor relationships".

The offeror was being asked to provide all of the above, along with all definitions, dictionaries, events, accomplishments, criteria, and any other supporting narrative in 20 pages. The requirements and the limits are obviously inconsistent.

> **- Required Data Fields** – The government team may want specific additional data to be included in the IMS text fields (e.g., IPT, WBS). The reason for this additional data is frequently to support sorting of the data using the different text fields as the sorting parameter. To provide some standardization, it is recommended that the **Table 3.1.** text fields be used for additional data (if using Microsoft Project. Other automated tools will probably have a similar function). The reason for recommending standard text fields is to avoid last minute RFP changes and the associated scrap/rework if the offeror has already entered the data in the IMS. It is definitely not the intent of this guide to recommend requesting all of the referenced data. The IMP numbering, WBS, and IPT are probably the most commonly requested data fields, and provide the most value for traceability and for sorting of the data. The general nature of most RFP Section M (Evaluation Factors) mission capability subfactors minimizes the value added of trying to trace each IMS task to a specific subfactor. The practice of identifying both a WBS and IPT for each IMS task may make a requirement for an organizational/functional code unnecessary. The offeror may want to trace the tasks to individual Contract Line Items (CLINs) for accounting purposes. It is up to each Procuring Activity to decide what additional data is needed for their program. Again, these requirements should "earn their way on."

Table 3.1. Additional Data Text Fields.

Additional Data	Text Field
IMP reference/code (single numbering system)	Text 1
WBS (if not part of IMP reference/code)	Text 2
SOW Reference (if not same as WBS)	Text 3
IPT	Text 4
Mission Capability Subfactor (RFP Section M)	Text 5
Risk (M-H)	Text 6
Contract Line Item (CLIN)	Text 7
Organizational/Functional Code	Text 10

Consideration: Use caution not to direct the use of fields that may already be used by other "plug-in" programs for the automated scheduling tools. For example, "Risk+," a risk assessment plug-in for Microsoft Project, uses Text fields 8 & 9.

- **IMS Hard Copy Format** – The IMS should almost always be submitted in electronic format**,** which contains all of the IMS data and can be used to sort the data in different ways for evaluation. However, the government team may also want a hardcopy submittal for evaluation purposes. In this case, rather than "shotgun" a boilerplate requirement in the RFP, it is recommended that the government team review with the source selection evaluators what format is actually needed for evaluation. The formats most commonly used are:

- **Gantt Charts** - A graphical display of program activities that depict work activities in an integrated fashion. Activities are represented by bars showing the length of time for each activity. These are best viewed in 11"x14" or 11"x17" pages.

- **Tabular Forms** – Tables containing data for each activity. These are best viewed in a landscape format (size page dependent on number of data fields requested).

Consideration: Requesting a large number of data fields in the tabular format can significantly drive both the IMS size and number of pages. Some RFPs have asked for over twenty (20) fields to be included in the hardcopy submittal.

Consideration: Requiring submittal of **both** Gantt and Tabular hardcopy formats can easily drive page size and page count to an unwieldy level. For example, on a particular large program competition, both formats were required. At least one of the offerors used "custom –built" 11"x17" binders to hold the 150-page IMS to avoid manually folding 150 pages for each copy submitted. Again, consider "value added."

Network Diagrams (PERT Charts) - These are charts that show all the task relationships. However, be aware that the network charts generated by many automated scheduling tools (e.g., Microsoft Project) are extremely large and have to be printed on plotters. There are some available "plug-in" tools that make it easier to view and/or print network charts (e.g., PERT Chart Expert for Microsoft Project), but the products are still significant in hardcopy format. It may be easier to use

views available in the electronic submittal to view the task relationships (see **paragraph 3.1.5.4.** for an example).

- **Electronic Format and Media** – Instructions as to type of electronic format desired for the IMP (e.g., Microsoft Word document compatible with Office <u>xx</u>, Adobe Acrobat (.pdf)) and for the IMS (e.g., Microsoft Project file compatible with Microsoft Project <u>xx</u>). Include instructions as to the media to be used (e.g., floppy disk, CD-ROM).

- **Automated Scheduling Tool** - The government team may have to dictate which automated scheduling tool it wants the offeror to use for the IMS submittal, particularly to facilitate evaluation. However, after contract award, it is important that the government use the same tool that the contractor uses for day-to-day execution of the program.

Consideration: If the government allows the offeror to propose a tool that the government team is not using, the RFP should ask the contractor to address issues such as post-award training of the government team, software tool licenses, etc.

- **Post-Award Data Submittals**– The RFP should address the desired format for post award submittals of updates to the IMS. If a CDRL item is desired, then the RFP should identify the appropriate Data Item Description (DID) and any tailoring instructions. The current DID used for IMS is DI-MISC-81183. The DID should be structured to govern post-award submittals. It is recommended that the DID allow contractor format.

Consideration: If the DID is too detailed or prescriptive, it could lead to the maintenance of two separate products; the one the contractor submits, and another one they use to actually execute the program.

- **Other** – Any other requirements that apply directly to the IMP or IMS. An example for the IMS might be a requirement to provide a rationale for all task durations greater than xxx days.

Consideration: Use caution to avoid conflicting guidance in the DID and Section L (ITO) of the RFP.

NOTE: To assist the offeror's teams in understanding and addressing the requirements discussed in this section, Appendix A to this document contains sample language for the offeror's SOW. Appendix B provides sample language that can be anticipated for RFP Sections L and M.

3.1.4. Execution IMP Development.

The same principles apply to the development of the Execution IMP, whether developed by a contractor or by the government program/project office. For a government-executed program or a sole-source contractor-executed program, the team can proceed directly from development of the Government Roadmap IMP/IMS to development of the Execution IMP. For competitive programs, the offerors will develop the Execution IMP for submittal with their proposal in response to the RFP. This proposed Execution IMP will be used in source selection as a tool for evaluation of the offeror's understanding of and approach to fulfilling the government's requirements. The successful offeror's IMP will be included in the resulting contract for use in execution of the program (see **paragraph 3.2.2.**).

Prior to developing the IMP (and its attendant IMS), the offeror's team must fully understand the overall system acquisition requirements. For competitive proposals, these will be contained in the

RFP. The team should first select the system-level events, which will serve as "progress checkpoints" and be used to indicate the readiness to move to the next group of work efforts. The next step is to identify the accomplishments and criteria to support each event. The individual IPTs should discuss and iterate these criteria and accomplishments with the "system-level" IPT to ensure that all critical activities from each functional discipline for all products are reflected in the IMP. It is important that significant subcontractor activities also be included in the Execution IMP. These in turn should be supported by the subcontractor's IMP/IMS or equivalent. The activities selected for inclusion in the IMP should not be ones expected to routinely change, as this would drives frequent contract modifications.

It should once again be emphasized that the distinction between events and accomplishments is often gray, as well as that between accomplishments and criteria. Very often the determination is a factor of the complexity, size or length of the program or project. It is not unusual to see the same activity designated an event in one IMP, and as an accomplishment in another. Similarly an accomplishment in one program may be a criterion in another, or a criterion in one might be an accomplishment in another, or even a task in the IMS. Examples of these "flexible" activities will be provided in **paragraph 3.1.4.2., paragraph 3.1.4.3. and paragraph 3.1.4.4..** As long as each activity supports the one above it, progressing from criteria to accomplishment to event, the intent of the IMP is met.

The typical 'steps' in the development of an IMP are:

- Determine the IMP structure/organization

- Identify Events, Accomplishments and Criteria

- Prepare introduction and narrative sections (may/may not be requirement for narratives)

- Complete the single numbering system

- Iterate events, accomplishment and criteria with the IPTs during IMS development

The following Sections define a generic IMP structure and describe the development of each section therein.

3.1.4.1. Organization.

This guide recommends the following as a common IMP structure to organize the previously defined elements of an IMP. However, this structure can be tailored as necessary to meet individual program/project needs, providing the structure is understood and useable by the whole government/offeror team:

Section 1 - Introduction

Section 2 - Events, Accomplishments and Criteria

Section 3 - IMP Narratives (if required)

Section 4 - Glossary

<u>Section 1 – Introduction</u>

The Introduction should include items such as the following:

 - Short description of the program*

 - Assumptions/Ground Rules*

   - Event and "Action Term" Dictionary* (expanded below)**

   - IPT Organization and responsibilities

   - Describe any unique or different features of your IMP

* Minimum content

IMP Dictionary (Event Definitions, Action Terms). Every IMP should include a dictionary with definitions of each of the events, as well as a common definition of the "action terms" used in the accomplishments/criteria descriptions (e.g., approved, submitted, verified, validated, and assembled). As the IMP becomes a contractual document, the dictionary and definitions are critical if we are to avoid misunderstanding and conflicts after contract award. Early discussions with the contractor are highly recommended to specifically address these items, as different expectations between the government and the contractor often result in both schedule and cost impacts. One example of an event dictionary section is shown as **Table 3.5. and an example of an "action term" dictionary is shown as **Table 3.2.** (In some cases, the Procuring Activity may want the IMP Event Table to include expected completion dates, which would be the fallout dates from the IMS. If used, these dates may become contractual dates that must be met, and could be tied to other contractual items, such as Award Fee. The Procuring Activity should clearly state whether the dates are intended to be contractual or simply for information.

Table 3.2. Event Definitions.

EVENT	DEFINITION
Post-Award Conference (PAC)	The purpose of this event is to ensure that the contractor's management processes and tools have been implemented and that both the government/contractor have a common understanding of the program to be executed. The IMP Accomplishments and Criteria and overall schedule will be reviewed, as well as risk status and program metrics. The PAC Event represents the transition from initial post-contract award process implementation and planning updates to a major block of activity related to ……………
Critical Design Review (CDR)	The purpose of this event is to ensure that the detail design is essentially complete. It will (1) determine that the detail design under review satisfies the performance and engineering requirements (2) establish the detail design consistency, (3) assess risk areas (on a technical, cost, and schedule basis), and (4) finalize the preliminary item specifications for the subsystems
Functional/ Physical Configuration Audit (FCA/PCA)	The purpose of this Event is to ensure that the contractor has established a baseline design and physical configuration that meets the performance requirements of the program. It includes validation that the development of a configuration item has been completed satisfactorily and that the configuration item has achieved the performance and functional characteristics specified in the functional or allocated configuration identification. It also includes a technical examination of designated configuration items (CI) to verify that the configuration item "As Built" conforms to the technical documentation which defines the configuration

Table 3.3. IMP "Action Term" Definitions.

Analysis/Analyzed — The subject parameter(s) has been technically evaluated through equations, charts, simulations, prototype testing, reduced data, etc.
Approved — The subject item, data, or document has been submitted to the government and the government has notified the contractor that it is acceptable. For some data items, it is specified that no response constitutes approval.
Available — The subject item is in place. The subject process is operational. The subject data or document has been added to the Data Accession List
Complete(d) — The item or action has been prepared or accomplished and is available for use and/or review.
Concurrence — The government has expressed its agreement with the contractors proposed design, approach, or plan as documented in either formal correspondence or meeting minutes, presentations, etc.
Conducted — Review or Meeting is held physically and minutes and action plans are generated. Test or demonstration is performed

Section 2 - Events, Accomplishments, Criteria

Begin this section with a description of your single numbering system. Then list (preferably in a table) your Events, Accomplishments and Criteria. An example is given below in **Table 3.4.** Again, the WBS elements related to each Criteria would represent a roll-up from each Criterion's supporting tasks in the IMS. A full sample IMP table for a "generic" program can be found in Appendix E, along with an "action" verb dictionary.

Table 3.4. IMP Events, Accomplishments & Criteria.

Activity #	Event
	  Accomplishment
	  Criteria
		WBS REF

A	Post Award Conference (PAC)	-
A01	Integrated Product Teams (IPTs) Fully Staffed and Chartered	-
A01a	IPT Contractor/Govt Members Identified	12120
A01b	IPT Charters Approved	12500
A02	Management Processes and Tools Implemented	-
A02a	Sys Engr/Program Mgt Processes/Tools in Place (IMP, Config, Quality)	12120, 12150, 12200
A02b	Business Mgt Processes/Tools (EVMS, WBS, Subcontract Mgt) in place	12120

Section 3 – IMP Narratives (If Desired)

- Task Narratives

- Process Narratives

- Other as necessary (e.g., risk discussion)

Section 4 – Glossary

Provide a glossary of terms and/or acronyms used in the IMP.

Consideration: There has been considerable discussion over whether the IMP should be broken into Sections by IPT or WBS elements. The recommendation of this guide is that the IMP not be broken into sections, but kept as one "integrated" plan that encompasses all IPTs, WBSs and functional disciplines. Section **3.1.5.5.** provides a discussion of how to sort the electronic version of the IMS (and therefore the IMP, as all events, accomplishments and criteria should be in the IMS) by IPT or WBS, or any other available fields, along with examples.

3.1.4.2. Event Selection.

Great care should be exercised in the final selection of the events framework upon which the IMP is constructed. They should represent major points at which it is logical to measure program progress. They should be well distributed over the program/project period, and not inordinately clustered. It is not desirable to have too long a period pass without checking critical program progress. This can be avoided by including an event such as a "Production In-Process Review" to insure timely program progress visibility. This is acceptable as long as there are definable accomplishments and criteria to support that event. At the same time, having too many events poses other problems, such as spending too much time and too many resources preparing for events rather than working the program activities. There are many reviews that will occur as part of the offeror's proposed processes, but every review does not need to be considered an IMP event.

Normally, the one executing the program (government or contractor) selects the events. However, as discussed earlier, the government team may specify a minimum number of events, derived from the Government Roadmap IMP/IMS. The execution team will then expand on that minimum set of events. Some suggested sources for candidate events and/or event definitions are: the Government Roadmap IMP/IMS, the RFP (section L, section B), the program requirements documents, and legacy standards, such as MIL-STD-1521, *Technical Reviews And Audits for Systems, Equipment, and Computer Software*, and EIA 632, *Processes for Engineering a System*. **Table 3.5.** provides examples of commonly used events (This list is not to be considered all-inclusive).

Table 3.5. Event Examples.

Technical and Management Review Events
Post Award Conference (PAC)
System Requirements Review (SRR)
Preliminary Design Review (PDR)
Critical Design Review (CDR)
Functional Configuration Audit (FCA)*
Physical Configuration Audit (PCA)*
Development Events
Subsystem Fabrication Complete*
Subsystem Integration Complete*
System Integration Complete*
Design Readiness Review (DRR)
Demonstration/Verification Events
Test Readiness Review (TRR)*
First Flight Readiness Review*
First Flight Complete
DT&E/OT&E Complete
Key Decision Points Where Progress Needs to Be Measured, Demonstrated, or Reviewed
Program Status Reviews
Progress Review #___
Production In- Progress Review
Low Rate Initial Production (LRIP) Decision
Full-Rate Production Decision
Key Production/Operational Events
Production Readiness Review (PRR)*
Low Rate Initial Production (LRIP) Complete
Production Lot __ Complete
Site Activation Readiness Review*
Site Activation
Initial Operational Capability (IOC)

NOTE: *Could also be accomplishments in support of other events rather than an individual event (e.g., the "Test Readiness Review" could be placed in the IMP as an accomplishment in support of a "First Flight" event, or the "Production Readiness Review" could be an accomplishment in support of an "LRIP Decision" event.

  3.1.4.3. Accomplishment Selection. Similar to "Event Selection," the accomplishment selection should reflect, as a minimum, any requirements and activities specifically identified in the RFP.

The execution team will then identify additional selected accomplishments in keeping with the definitions provided in **Chapter 2**. During this process, the team may identify additional required events, or may even determine that an already identified event should be deleted or replaced. There is no typical number of accomplishments for each event in the IMP. The important point is that each selected accomplishment when completed should substantially contribute to the success of the related event. **Table 3.6.** contains examples of accomplishments (indented under notional events).

Table 3.6. Accomplishment Examples.

Event
Accomplishment
Preliminary Design Review
Design Implementation Trade Studies Complete
System Architecture Update Complete
System Requirements Allocation Complete
All Functional And Physical Interface Requirements Identified
Aircraft Preliminary Design Complete
Preliminary Design Assessments Complete
PDR Conducted
Critical Design Review
Final Design Trade Studies Complete
(System) Detailed Design Complete
CDR Conducted
Test Readiness Review
Test Assets Available*
Test Planning Complete*
Test Support in place
FCA/PCA
Formal Qualification Test (FQT) Complete
Prototype Production Complete*
FCA/PCA Conducted

NOTES:

*Could also be criteria in support of other accomplishments rather than an individual accomplishment (e.g., "Test Assets Available" could be placed in the IMP as a criterion in support of a "Test Readiness Review" accomplishment supporting a "First Flight" event).

An important point must be made concerning accomplishments. As the IMP is the product of an IPPD process, the accomplishments should reflect the required progress of all functional disciplines. For example in support of a Preliminary Design Review (PDR) event, the first accomplishments identified

are almost always related to hardware and software design activities. However, it may be critical to the program execution that well-defined "long lead" materials or Government Furnished Equipment (GFE) be ordered by completion of the PDR, so as to be available for the timely fabrication of DT&E test articles. There are likely preliminary logistics support activities that should be completed in support of the PDR (Initial provisioning conferences, preliminary Support Equipment Recommendation Data (SERD) submittal, etc.) In any such case, it would be appropriate to identify accomplishments (or criteria, at a minimum) for these activities.

3.1.4.4. Criteria Selection.

As with events and accomplishments, the criteria selection should reflect any specifically identified requirements from the RFP. The execution team will then identify additional criteria in keeping with the definition provided in **paragraph 2.2.2.3.** The question that needs to be repeatedly asked when developing criteria is, "How do I know when an accomplishment has been completed?" The more definitive the IMP is, the clearer the understanding of the program will be. As with accomplishments, the team may identify additional required accomplishments and events, or may determine that an already identified accomplishment should be replaced. Again, there is no typical or required number of criteria for each accomplishment in the IMP. Generally, there should be at least two criteria to support an accomplishment, but there may be times when one is appropriate. The important point is that completion of the criteria should provide evidence of completion of the associated accomplishment. **Table 3.7.** contains examples of criteria (indented under the notional associated accomplishment and event). As explained in **paragraph 2.2.2.3.**, certain events lend themselves to the use of "exit" and "entrance" criteria. Some examples of these are also included in the table.

Table 3.7. Criteria Examples.

Event	
Accomplishment	Entrance - ENT
Criteria	Exit - EX
Preliminary Design Review	
Design Implementation Trade Studies Complete	
Airframe Preliminary Design Trade Studies Complete	ENT
Avionics Preliminary Design Trade Studies Complete	ENT
System Requirements Allocation Complete	
System Requirements Allocated To Subsystems	ENT
Preliminary Segment Performance Requirement Documents Complete	ENT
All Functional And Physical Interface Requirements Identified	
Preliminary Interface Definition Complete	ENT
Draft Interface Control Documents Complete	ENT
Preliminary Design Assessments Complete	
Preliminary System Safety Hazard Analysis Complete	ENT
Design Risk Assessment Updated And Risk Reduction Options Identified	ENT

PDR Conducted	
PDR Agenda and Data Items Submitted	ENT
PDR Meeting Conducted and Action Items Established	EX
Test Readiness Review	
Test Planning Complete	
Approved Test Procedures Available	ENT
SEEK EAGLE Flight Clearance Obtained	ENT
Safety Review Board Complete	EX
Test Support in place	
Support Assets Delivered (Spares, SE)	ENT
Tech Manuals Delivered	ENT
Flight and Maintenance Crew Training Complete	EX
Software Delivery 1	
Delivery 1 Application Modules Complete	
Delivery 1 application software code and test complete	
COTS and Applications Software Integrated	
All COTS hardware and software integrated	
All COTS hardware and software integrated with applications software	
Delivery 1 External Interface Tests Complete	
All IOC external interfaces defined	
All IOC external interfaces tested with development lab "live" links	
Security Accreditation Complete	
On-site accreditation testing successfully completed	
Written approval for operation received from accrediting agency	
LRIP Decision	
QT&E Complete	
Formal Qualification Test (FQT) Complete	
QT&E Performed	
QT&E Failures Resolved	
OT&E Complete	
OT&E Assets Delivered	
OT&E Performed	

There may be occasional cause to use key performance requirements as criteria, particularly if the accomplishment is related to a technical demonstration of some sort. But the criteria should only make reference to the applicable specification paragraph(s)or area of the technical requirements document or the system specification (e.g., "Airspeed Key Performance Parameters (KPPs) Dem-

onstrated"), and not quote the specific performance requirements. This would result in redundancy with the specifications and provide the potential for contractual disconnects.

Consideration: Experience indicates that there will frequently be "open items" associated with the completion of events (e.g., Major Review action items, Deviations, Waivers, retest). If the open items are severe enough, the event may be deemed incomplete and the program not allowed to progress further. However, there will be other times when it is prudent to identify action items and their closure plans, but designate the event complete. One possible way to achieve this flexibility and still maintain program discipline is to place a criterion in each event for the "resolution of action items" from the previous event.

3.1.4.5. IMP Narratives.

If the government RFP requests the inclusion of IMP Narratives, they should be placed in this Section. The following provides general guidance for the preparation of IMP Narratives:

Task Narratives

Task Narratives can be used to describe tasks that aren't normally found in the IMP (e.g., the conduct of a System Safety program or Quality Assurance program, which are Level of Effort (LOE) tasks) or broad-level tasking traditionally found in the SOO or SOW. If a Task Narrative should describe efforts related to a specific SOW task, then it would be desirable to reference the SOW paragraph number, as well as the applicable WBS, in the narrative. Task Narratives would be a definite requirement if the program were to decide to use the IMP in lieu of a SOW.

Process Narratives

In general, the narrative should address only the key elements of developing or implementing a process/procedure (i.e., what the process/procedure will be or how it will be tailored and/or implemented on the specific program or project.). The narrative is not the forum for providing supporting information or rationale (i.e., why a particular approach has been taken). This information should be provided in the technical/management proposal. As with Task Narratives, Process Narratives should reference a SOW paragraph number and WBS, if applicable.

The offerors should begin by deciding which critical processes will be included in the narratives, in addition to any minimum set requested in the RFP. Each individual process narrative should include the following types of information:

 a) Reference to any governing documentation, such as the contractors standard process, or any governing DoD/Service guidance

 b) An overview of the process. The use of process flow diagrams (**Figure 3.3.**) is highly effective and is encouraged.

Figure 3.3. Technology Insertion Process Example.
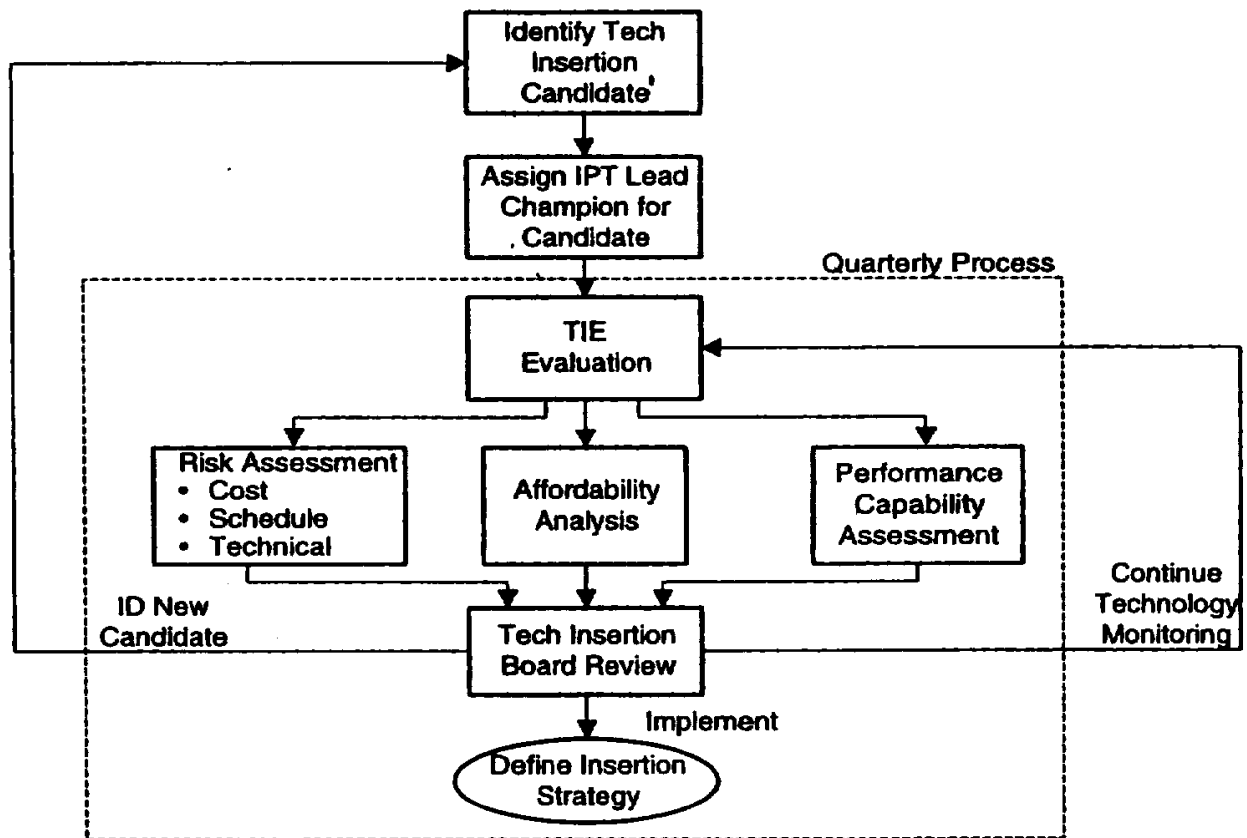
c) If the process is an existing one, describe how it will be tailored to the specific program/project

d) How the process will be implemented on the specific program/project

e) Description of any metrics that will be used to measure the process

Consideration: While descriptions of LOE tasks and processes can be placed in the IMP Narratives, there may be significant and specific outputs of these tasks and processes. Examples would be a Quality Assurance Plan or a System Safety Hazard Analysis. These types of outputs should be reflected in the IMP and/or IMS.

Other IMP Narratives (As necessary)

This is where the offeror may provide any additional information to enhance both the offeror's and government's understanding of the program.

3.1.5. Execution IMS Development.

To develop the Execution IMS, the team will have to capture all tasks that constitute the work required for successful completion of the program. These tasks are the time phased, detailed activities required to support the IMP criteria and accomplishments, and are a natural expansion of the IMP. Conse-

quently, the IMS uses the IMP events, accomplishments, and criteria as the skeletal structure to determine the detailed tasks. The detailed tasks represent the individual pieces of work effort that consume resources and that are completed in support of each of the specific criteria. The descriptive labels used in the IMS shall be identical to those used in the IMP. Each event accomplishment and criteria shall be labeled with a brief descriptive title, numbered or coded to correlate to the IMP. Through this structure, the IMS tasks will be directly traceable to the IMP

The IMS provides the dates by which each of the IMP criteria, accomplishments, and events will occur by providing the timing of all the detail regarding the actual work toward them. It is, therefore, only after developing the IMS that the expected dates for completion of the contractual IMP items can be determined. As all IMP items are normally present in the IMS, there will be associated dates for each. These dates are naturally subject to change as the program proceeds and actual progress does not match precisely with planned progress. As explained earlier, that is one of the reasons for not making the IMS a contractual item. The other is that some of the tasks themselves may change for a variety of reasons, without affecting the validity or completion of the criteria.

Some of the objectives of an IMS are as follows

- Maintain consistency with the IMP

- Illustrate the interrelationships among events, accomplishments, criteria and tasks

- Illustrate the start and completion dates for each event, accomplishment, criteria and task

- Indicate the duration of each event, accomplishment, criteria and task

- Provides a critical path

- Provide the ability to sort schedules multiple ways (e.g., by event, by IPT)

- Provide schedule updates on a regular basis

- Provide an indication of all completed actions

- Indicate schedule slips with original and reschedule dates

- Provide electronic access to the current master program schedule for contractor, government, and support contractor personnel

- Provide the capability for the government, contractor, or support contractors to perform "what if" schedule exercises without modifying the master program schedule

- Maintain consistency with the work package definitions and the Earned Value Management System (EVMS)

Although specifying dates is not recommended, the government may specify a limited number of date-related delivery events required by other parts of the contract (see guidance in **paragraph 3.1.3.2.**, Date Constraints).

The typical 'steps' in the development of an IMS are:

- Determine the IMS "hard copy" organization

- Transport the IMP events, accomplishments and criteria into the automated tool being used

- IPTs identify the detailed tasks and durations

- IPTs identify the task constraints and relationships

- IPTs iterate with IMP/IMS point of contact

- Complete/update the single numbering system

- Perform critical path/schedule risk analysis

- Complete the IMS document

- The following Sections define a generic structure for the IMS, and describe the development of each section therein.

3.1.5.1. Organization. The Execution IMS will normally be developed using an automated scheduling tool and will primarily exist as an electronic file. The initial electronic IMS will typically have 4 levels of indenture, events, accomplishments, criteria, and tasks (see **Figure 3.4.**). However, there may be times when less than 4 levels are appropriate (e.g., a criterion is a specific activity that doesn't need to be broken down further, and a duration and relationship is assigned at that level). On the other hand, it may be appropriate after contract award for the IPTs to break some IMS tasks down further in the form of subtasks.

Figure 3.4. IMS Levels of Indenture.

ID	Task Name	Dur	Start	Finish	A	S	O	N
1	___ PROGRAM	1 d	10/1/C	10/1/C			I	
2	Contract Award	1 d	10/1/C	10/1/C			I	
3								
4	IMP EVENTS	1 d	10/1/C	10/1/C			I	
5	A - Post Award Conference	0 d	10/29/	10/29/				♦ 10/29
6	B - Preliminary Design Review	0 d	1/29/C	1/29/C				
7	C - Critical Design Review	0 d	5/28/C	5/28/C				
8	D- Test Readiness Review	0 d	8/1/0:	8/1/0:				
9	E - FCA/PCA	0 d	10/31/	10/31/				
10								
11	EVENT	1 d	10/1/0	10/1/0			▼	
12	Accomplishment	1 d	10/1/0	10/1/0			▼	
13	Criteria	1 d	10/1/C	10/1/C			I	
14								
15	Post Award Conference (PAC)	31 (	9/17/0	10/29/			▬▬▬	
16	Integrated Product Teams (IPTs) Staffed and Chartered	15 (	10/1/0	10/19/			▬▬	
17	IPT Contractor/Govt Members Identified	15 (	10/1/0	10/19/			▬▬	
18	Complete staffing of Contractor IPTs	15 (	10/1/C	10/19/			▬	
19	Identify SPO IPT members	10 (	10/1/C	10/12/			▬	
20	Identify other Govt agency IPT members	10 (	10/1/C	10/12/			▬	
21	IPT Charters Approved	15 (	10/1/0	10/19/			▬▬	
22	Prepare Team Charters,goals	10 (	10/1/C	10/12/			▬	
23	Coordinate and approve Team Charters	5 d	10/15/	10/19/			▪	
24	Initial Subcontractor/Associate Contractor Start-Up Com	30 (	9/17/0	10/26/			▬▬▬	
25	Initial Subcontracts awarded	20 (	9/17/0	10/12/			▬▬	
26	Turn on ___ subcontract	10 (	10/1/C	10/12/			▬	
27	Turn on ____ subcontract	5 d	10/1/C	10/5/C			▪	

Note that in **Figure 3.4.** the contract award date is placed at the beginning of the IMS, as well as a listing of all the IMP Events. By tying this list to each of the event completions within the body of the IMS, a quick summary of the event completion dates is created.

For proposals, there is normally an IMS document created and submitted, in addition to the electronic file. This document is used to facilitate evaluation, and allows the offeror to provide additional information on the IMS. The following is one suggested format for the IMS. This structure can be tailored as necessary to meet individual program/project needs:

<u>**Section 1 – Introduction**</u>

The Introduction should include items such as the following:

- Short Overview of the IMS

- Assumptions/Ground Rules for the IMS (calendar used, holidays constraints, etc.)

NOTES:

In most automated scheduling programs, there are 5 days in a week and 22 days in a month.

- Describe any unique features of your IMS. The following are examples:

- Single Numbering System

- Additional data fields included (identify associated text/other field)

- Description of how the IMS and any changes to it will be managed

Section 2 – IMS Hardcopy Format (as required in RFP or as determined by offeror)

- Summary Schedule (one page – Gantt Format)

- Gantt Format

- Tabular Format

Section 3 – Schedule Rationale (if necessary)

This section provides any supporting schedule rationale for items such as long task durations, task constraints other than As Soon as Possible, or very long lead/lag times. Sections **3.1.5.2.** and **3.1.5.3.** contain some examples of schedule rationale.

Section 4 – Critical Path and Risk

This section may include a hardcopy format (Gantt or Tabular) and a discussion of the program critical path. The critical path should be easily distinguished on report formats. This would also be an appropriate section to discuss any schedule risk assessment performed by the offeror (see Section 6 for further discussion of schedule risk assessment).

Section 5 – Glossary

Provide a glossary of terms and/or acronyms used in the IMS.

3.1.5.2. Detailed Task Identification.

Each IPT will develop its portion of the IMS by determining what tasks are necessary to support the criteria and accomplishments of the IMP. For each task, the IPT will provide a task name (normally active tense), a duration, constraint type, and relationship with other tasks (predecessor(s)). This will allow the identification of the critical path for the program. (**paragraph 3.1.5.3.** and **paragraph 3.1.5.4.** provide further definition of task constraints and relationships). Minimum and maximum durations may be required for a statistical schedule risk analysis (discussed under **paragraph 3.1.5.6.**). The IPT should also confirm the related WBS element for each task with the IMP-IMS point of contact (POC), using the WBS Dictionary.

The building of the IMP/IMS is an iterative process. If an IPT, while building the IMS, should identify required tasks that don't logically fall under existing identified IMP criteria, they should suggest additional criteria and/or accomplishments those tasks would come under. The desired result is a clear track from events to accomplishments to criteria to tasks. This makes it easier for

the government and the contractor to assess the progress/maturity of the program and ensures that the program is event-driven.

If the IMS has long duration tasks (typically over 125 days), the team should review these tasks to determine if further breakdown is appropriate. If not, the contractor may want to provide the rationale in the IMS document (see **Table 3.8.** for examples). The same might be true for tasks with long lead or lag times (See **Table 3.9.** for examples). Also, it may be desirable to identify moderate-to-high risk tasks. This can be done through the use of text fields in the electronic file. Specific risk mitigation activities from the Risk Management Plan should be reflected in IMS. The team may decide to include Level of Effort (LOE) tasks described in the IMP Narratives. In this case, it is suggested that they be placed at the end of the IMS and not be tied to the other tasks in the IMS.

Table 3.8. Duration Rationale.

TASK ID*	TASK NAME	DURATION	RATIONALE
A01a05	Procure/Receive Group B hardware for XXX	180d	Typical procurement time based on supplier quotes
E01c01	Conduct DT&E flight test	140d	Reflects the planned flight test period and includes <u>x</u> flights
E01c02	Perform DT&E data reduction, analysis and reporting as required	140d	Length runs concurrently to flight test timeline

Table 3.9. Long Lead-Lag Time Rationale.

TASK ID*	TASK NAME	LAG/LEAD	RATIONALE
586	Conduct aircraft thermal signature analysis	SS+110d	Does not need to begin until after a significant amount of flight test has been accomplished
727	Install AMP kit on C-130H3 (BAE #3) and deliver	SS+77d	Lag to maintain a smooth production flow and avoid starts and stops

NOTE: *task can be identified by either the IMP/IMS Activity # or the scheduling tool line number.

Consideration: If LOE tasks are placed in the electronic IMS, caution should be used to avoid these tasks "grabbing" the critical path. This can happen if any LOE task becomes the last completed activity in the IMS. This is most likely to happen during the running of statistical "Monte Carlo" risk assessment tools. This can be avoided by artificially keeping the completion date of LOE tasks well short of the program ending date and not allowing the duration to vary during the assessment.

3.1.5.3. Task Constraints.

In building a program schedule, it is highly desirable to have all tasks start "As Soon As Possible." Then the start date for each task will be determined by its relationship to other IMS tasks (it's predecessors). This kind of relationship provides maximum flexibility to keep within the constraints of the critical path times under many conditions. It also allows us to change the critical path in a manner that causes the least disruption to the planned schedule. However, there are instances

where constraints may have to be placed on a task. The Execution IMS should not use hard constraints, such as "Must Start On," "Must Finish On," "Finish No Later Than," and "Start No Later Than." These types of constraints do not support a credible risk assessment, and will give unreliable results in a statistical risk assessment. There may be some hard constraints in the Government Roadmap IMP/IMS, dictated by higher authority, but they should not be carried as hard constraints into the IMS. It is recommended that the IMS use the following types of soft constraints:

- Start No Earlier Than

- Tasks not controlled by the execution team, for which the team has been given projected dates (e.g., GFE Deliveries, common production line assigned dates)

- Tasks which may have to be scheduled in conjunction with other contractor programs for efficiency (e.g., scheduled blocks of time in a shared production facility)

- Finish No Earlier Than

- "Just-in-time" tasks on separate contracts (e.g., desire to hold delivery on two components until third component is available)

- It is recommended that the IMS provide a rationale for constraints other than "As Soon As Possible," to enhance the understanding of all users of the IMS. **Table 3.10.** provides an example.

Table 3.10. Constraint Rationale.

TASK ID	TASK NAME	Constraint	RATIONALE
L02a01	Order XXX Group A & B production materials (Lot Y)	Start No Earlier Than	Represents the beginning of Fiscal Year, the earliest the Government can award the Production Option
# 324	Receive GFE Support Equipment	Start No Earlier Than	Projected earliest delivery by government

3.1.5.4. **Task Relationships.**

To build a truly integrated schedule that accurately reflects the program/project status, all interrelationships among tasks must be identified. Without accurate relationships, the planned execution phasing will be wrong, the critical path will be wrong, and any statistical schedule risk assessment will be suspect. The IPT members responsible for the tasks must determine these relationships, and iterate them with other IPTs. The relationships are normally assigned to the tasks as predecessor relationships, and the scheduling tool will then normally generate the listing of successor tasks. Following are the types of relationships used by Microsoft Project (although the Finish-to-Start relationship is the "cleanest "and most preferred one, there are real requirements in many programs for all of the relationships):

 a) **Finish-to-Start (FS)** – the standard "one task must finish before another starts" link; - (e.g., a test cannot begin until test procedures are written. The prerequisite for the "Conduct tests" task is "Write test procedures"- FS). This is the cleanest relationship.

 b) **Start-to-Start (SS)** - this is used when one task cannot start until another starts (often involves some lag time); (e.g., A test is scheduled to go on for four weeks, but the task of gathering test

results can begin 1 week after the start of the tests. Therefore, the predecessor for the "gathering results" task is "Conduct tests" SS+5d)

 c) **Finish-to-Finish (FF)** - appropriate where only task completion (but not the start) is driven by another task (e.g., the design of an air vehicle could start anytime, but can't be completed until 1 month after wind tunnel results are available. In this case the "Conduct wind tunnel tests" task would become a predecessor for the "design the air vehicle" task with a "FF+22d" relationship).

 d) **Start-to-Finish (SF)** - used for administrative-type tasks you want driven by another task (e.g., preparing the agenda two weeks prior to a review; this task is driven by the start of the review. If the review, which is driven by other tasks, should slip, you would probably want to delay the agenda preparation. The predecessor for the "Prepare agenda" task would be "Conduct the ___ review"-SF-10d). Could also apply to "just-in-time" activities (e.g., delivery of support equipment for a test).

Section 3.1.3 highlighted the difficulty in printing a network (or PERT) diagram of reasonable size. However, it is possible in some programs to provide a view that illustrates network relationships. Figure 10 gives an example of such a view in Microsoft Project that shows the predecessors and successors for any selected task. The view is a "combination" view, with the top half being a "Task" view and the bottom a "Task PERT" view:
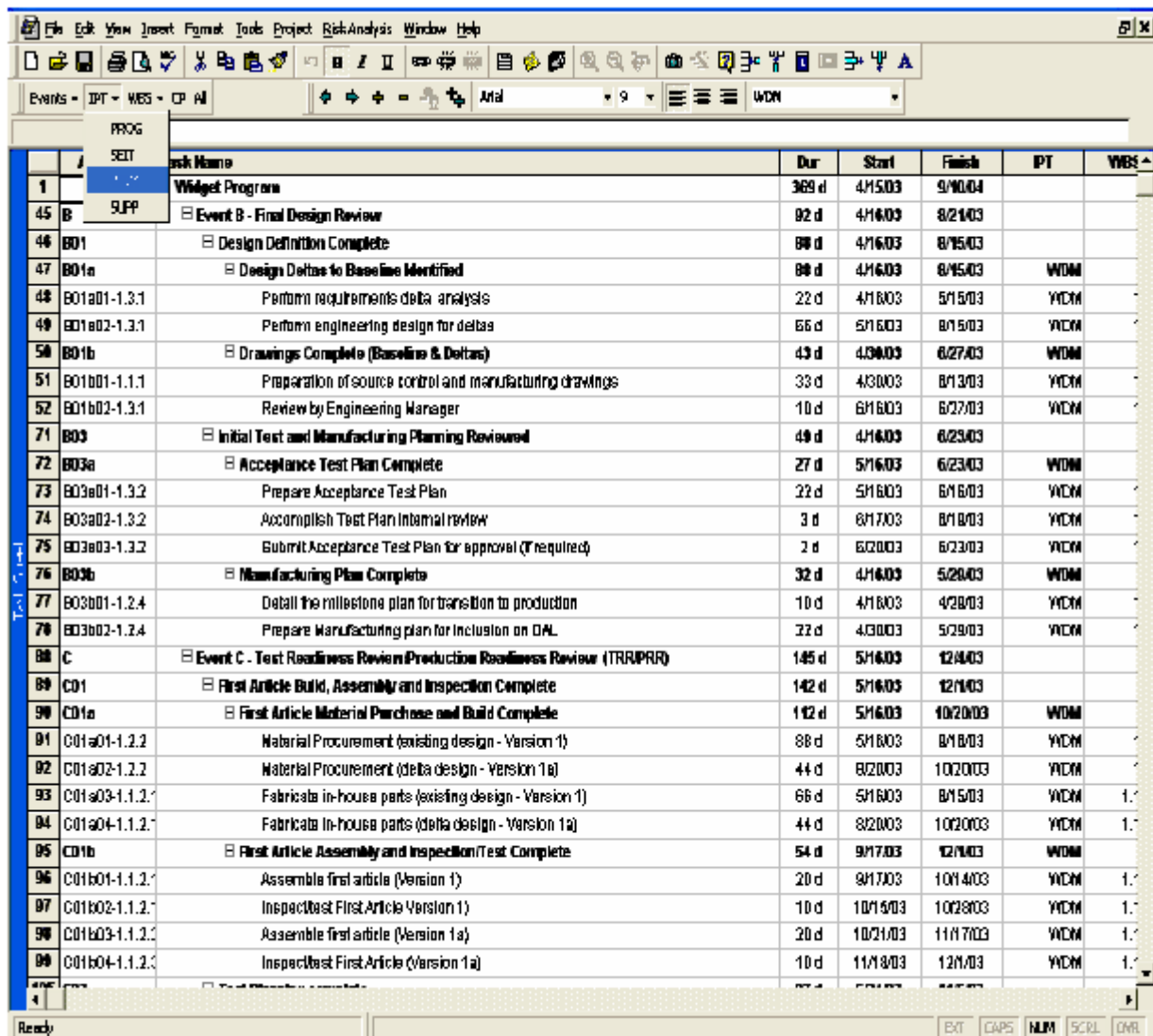
Figure 3.5. "Combination" View Showing Network Relationships.
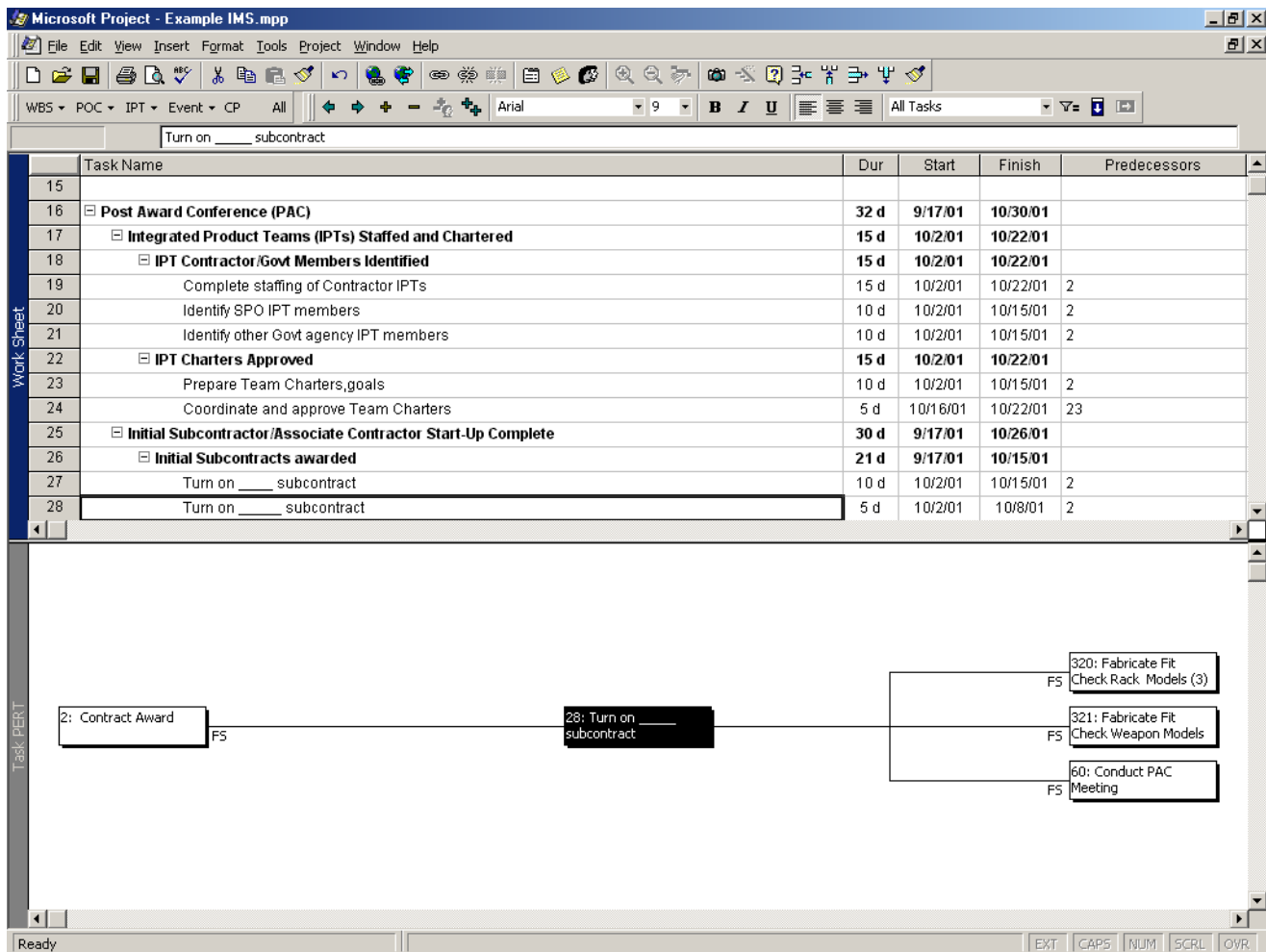
3.1.5.5. Sorting the IMS.

Throughout this guide, we have referred to the capability of sorting the IMS by IPT, WBS, etc. This can usually be accomplished through the use of filters based on information contained in data fields. These filters can use almost any data field as a sorting parameter. In Microsoft Project, one would most commonly use the text fields listed in paragraph **3.1.3.2.**, **Table 3.1.**. The filters allow one to quickly sort the IMS tasks by categories such as IPT, WBS, or event. One way to make these filters quickly accessible in Microsoft Project is to build a custom tool bar with pull-down menus of the filters. **Figure 3.6.** contains an example of an IMS sorted by IPT (in this case, SS stands for System Support IPT) using a custom toolbar and pull-down menu, while **Figure 3.7.** illustrates a sort by WBS using the same toolbar. The filters can be built to include only tasks or to include related summary tasks (events, accomplishments and criteria).

Figure 3.6. IMS Sorted by IPT.

Figure 3.7. IMS Sorted by WBS.

3.1.5.6. Schedule Risk Analysis.

After preparation of the IMS, it is appropriate to analyze the schedule and its associated risk. In competitive or sole source procurement, the offeror should perform an analysis and address it in the submitted IMS document. This analysis should include a discussion of the critical path, so as to identify tasks to be watched. The reader should be cautioned, however, about developing "tunnel vision" focused on the critical path activities. Many programs have been "bitten" not by the critical path activities, but by another activity just off the critical path. There are three basic types of schedule risk analysis:

    a. Narrative Schedule Risk Analysis – this should be an explanation of the overall schedule risk, normally performed by the offeror and included in the IMS document. It would also include analysis of the critical path.

    b. Technical Schedule Risk Analysis – this is a qualitative evaluation, normally performed by the government source selection functional experts

    c. Statistical Schedule Risk Assessment (SRA) – normally a "Monte Carlo" type simulation using software programs designed for that specific purpose (e.g., "Risk +," a plug-in to Microsoft Project). The program performs simulated "runs" of the entire program many times while randomly varying the durations according to a probability distribution. The results indicate a "level of confidence" for the integrated schedule. The SRA can be performed by either or both the offeror and the Procuring Activity after assigning minimum and maximum durations for each task. The SRA can also be a valuable tool for "what-if" exercises to quantify the impacts of potential program changes.

The government's assessment of what items are moderate or high risks may not match the offerors' assessed risks for the proposed approach. The offerors should be allowed to identify any appropriate areas of risk and discuss why the government's anticipated risk will not materialize using their approach. The potential schedule impacts of the technical risks associated with the off-

eror's proposed approach is determined during the source selection process by examining the best /most likely/worst case duration of the work flow of activities associated with the specifically risky aspects of that offeror's approach.

If the Procuring Activity plans to do a statistical schedule risk assessment, the proposed IMS is typically requested to be delivered in an electronic format that can be input to a schedule networking software that is compatible with the government's selected schedule risk assessment software package. The schedule team loads the offeror's proposed schedule data and then may make adjustments to the data to reflect the government technical teams' assessment of the contractor's schedule. The schedule risk assessment software uses Monte Carlo simulations for each of the activities given the range of duration, for the purpose of determining a cumulative confidence curve. An example of a product from a "Risk +" SRA is shown in **Figure 3.8.** Some SRA programs will also do a "critical path analysis", identifying the number of times every task in the IMS shows up on the critical path during the simulation runs. This can be a great help in expanding the "tunnel vision" on critical path activities discussed above.

Figure 3.8. Sample SRA Results.

Date: 1/2/98 12:19:06 PM
Number of Samples: 1000
Unique ID: 15
Name: System Requirements Review

Completion Std Deviation: 5.2d
95% Confidence Interval: 0.3d
Each bar represents 2d.
    SRR

Completion Probability Table

Prob	Date	Prob	Date
0.05	6/5/98	0.55	6/19/98
0.10	6/9/98	0.60	6/22/98
0.15	6/10/98	0.65	6/22/98
0.20	6/11/98	0.70	6/23/98
0.25	6/12/98	0.75	6/24/98
0.30	6/15/98	0.80	6/25/98
0.35	6/16/98	0.85	6/26/98
0.40	6/16/98	0.90	6/29/98
0.45	6/17/98	0.95	6/30/98
0.50	6/18/98	1.00	7/9/98

Consideration: When performing an SRA, it should be noted that the "confidence level" of making the exact dates in the IMS would typically be very low. This is not unusual, and occurs because during the simulation all tasks can expand to their maximum duration; however, not all can shorten to their minimum duration, because other tasks will move onto the critical path in their place. The definition of a "high confidence" schedule should take this into account, and set an acceptable band around the event completion dates.

Consideration: It is very important to have a proper analysis concerning the potential causes for schedule disruption and to choose credible min, max and most likely durations. Often this process has been used to try to force fit the schedules, using faulty assumptions. An SRA is only as credible as the min-max durations.

3.1.5.7. Resource Loading of IMS.

This guide does not recommend the resource loading of the IMS for proposal submittals. Depending on the individual program, it might be appropriate to add resource loading after contract award, if the same software tool is being used for cost accounting and reporting.

Consideration: In competitive procurements, the offerors will probably be making adjustment in resources and pricing right up until proposal submittal. It is very difficult to keep the resource loading in the IMS updated at this point. In fact, this loading will most likely be adjusted after contract award, making the pre-award value doubtful.

Consideration: To conduct a Monte Carlo simulation on an IMS, it is critical to have a good critical path network. Characteristics are: no constraint dates, lowest level tasks have both predecessors and successors, and over 80 percent of the relationships are finish to start.

3.1.6. IMP/IMS for Evolutionary Acquisition.

The new DoD acquisition policy (DoD Directive 5000.1 and DoD Instruction 5000.2, both dated May 2003) emphasizes the adoption of an evolutionary acquisition strategy, with either a spiral or incremental development process for new programs. The basic IMP/IMS philosophy for Evolutionary Acquisition is unchanged. However, what is to be actually placed in the IMP and IMS can vary significantly. In this case, it is recommended the overarching Government Roadmap IMP/IMS capture as much as possible of the spiral/incremental development plan. This is particularly important, as an evolutionary approach will most likely increase the number of interfaces and integrations for the total program. However, the Execution IMP/IMS should only treat those portions of the plans that can be fairly well defined (e.g., priced options). Individual Execution IMP/IMS will then be developed for each successive spiral or increment of the evolutionary acquisition as they become more clearly defined and are placed on contract. The Individual Execution IMP/IMS should be linked back to the overarching Government Roadmap IMP/IMS.

3.2. Implementation/Execution.

3.2.1. Pre-Contract Award.

The Government Roadmap qIMP/IMS is developed and implemented by the government team as early in the program as possible, i.e., in the pre-RFP phase. The Government Roadmap IMP/IMS will provide the framework for development and implementation of any Pre-Award IMP/IMS or for the Execution IMP/IMS. In the case of a government-executed program or project, the government team should proceed immediately into the preparation of an Execution IMP/IMS, which can be implemented immediately after preparation. In a sole source contract environment, the government/contractor team can likewise begin development of the Execution IMP/IMS. The resultant Execution IMP/IMS can be implemented as soon as contract authorization is given.

During competitive acquisitions, the Procuring Activity may decide to prepare and implement a Pre-Award IMP/IMS to better plan, manage and track the activities required to get to contract award. Based on the Roadmap IMP/IMS, they will then determine any program-unique requirements for the Execution IMP/IMS, for inclusion in the RFP. The offerors will then provide their proposed Execution IMP/IMS as a part of their proposals, reflecting each one's unique approach to fulfillment of the program and technical requirements. These products will be evaluated by the government source selection team in accordance with the evaluation standards detailed in Section M of the RFP.

3.2.2. Post-Contract Award. When the contract is awarded, the IMP submitted by the winning contractor becomes a part of the contract. The IMS submitted will be baselined, and become the basis for updates normally submitted either as a CDRL, according to the instructions contained in the tailored DID, or through the Data Accession List (DAL). This regular deliverable will be provided for day-to-day execution. Changes to either the IMP or IMS during program/project execution are discussed in **paragraph 3.2.2.**. The following sections discuss some of the different facets of post-award use of the IMP/IMS.

3.2.2.1. Communication.

Open communications and trust are critical during program execution. This includes communication between the government and contractor as well as internal government communication between the various program teams and with other government organizations. The Execution IMP/IMS information is critical to providing the baseline for communication and execution of the program. This is especially true for the program teams because of the complexity and the integrated nature of an acquisition program. Without a cross flow of information between the program IPTs, "team stovepipes" are created. It is important to recognize that most program events directly affect all IPTs and there is a need to establish a communication link that ensures that all interfaces are recognized and addressed. If problems are identified and addressed regularly in team meetings through IMS statusing, mitigation plans can be formulated to minimize program disruptions and their cost and schedule impacts.

In many programs, electronic data interchange is available between the contractor and the government team. In these cases, the IMS could be made available to the government team on an ongoing basis. However, it should be set up so that only the contractor can make direct changes to the IMS

Consideration: Contractors may be reluctant to provide day-to-day access to the government team if they believe it will result in micromanagement through the IMS. It is the responsibility of the government team to avoid "killing them with oversight."

3.2.2.2. Program Tracking.

Updates to the schedule may be documented as they occur, however, a time for a "block change" of the IMS should be designated to ensure the schedule is kept current. As projected slips to the schedule become apparent, the impact to the critical path for that activity should be assessed, and work-around plans developed. If program status is being reviewed regularly in team meetings and through IMS statusing, the formulation of mitigation plans to minimize program disruption and avoid cost and schedule impacts, should be an ongoing activity.

The work-around plans can be used at several different levels. At the program team level, the expected activities can be tracked and monitored at working group meetings (e.g., Test Plan Work-

ing Group, Integrated Logistic Support Working Group). The IMS documentation of what has to be accomplished to complete each of the activities is an invaluable tool to assess the current status and project potential problems in activity completion. To be effective, as soon as it is determined that scheduled tasks cannot be accomplished as required, management must be notified. Then the process can begin to assess the overall program impacts and formulate plans that will assure program integrity.

3.2.2.3. Program Analysis. From a program perspective, the Execution IMP is baselined and the associated IMS network schedule should be used as the starting point to assess and mitigate the impacts caused by program perturbations.

3.2.2.3.1. Directed Budget Cuts.

In the case of directed budget cuts, critical path analysis can be used as a starting point to identify items for potential cut that would cause the least program impact. More importantly, after identification of the efforts to be cut, the specifically impacted program teams can be tasked to assess the impacts to determine if they are "doable." This process has the potential to provide superior impact analysis than previous methods. After the team's analysis, the teams should be better able to execute the changes, as they helped analyze and define them, and make them "more executable." Conversely, if the impacts are unacceptable, the IMS information developed should help support the analysis, and lead to the identification of other options to be investigated.

When changes have to be made to the program, the Execution IMP/IMS must be updated to reflect the revised planning, and this must be communicated to all program participants. The program team should ensure that program financial planning and the EVMS baselines, if applicable, are adjusted to reflect the new, approved baseline.

3.2.2.3.2. "What If" Exercises.

A complete IMS with well-defined relationships can be responsive to "what if" exercises at varying levels. Most "what if" exercises represent significant potential changes to the program funding, content and approach. A sufficiently descriptive IMS can be an invaluable tool to examine alternatives to provide meaningful answers to the questions conveyed in "what if" exercises. Also, statistical risk analysis tools as described in **paragraph 3.1.5.6.** can be used to support these "what if" exercises.

3.2.2.4. Reporting.

Each program should determine the level and format for reporting program progress and problems to internal and external management. The program teams can internally track activities to any level they consider necessary, but will need to roll up those tasks to reflect the pertinent information desired at each management level. Internal program reviews may be conducted to provide senior management the current execution status in terms of cost, schedule, and performance. The information required would be expected to be significantly less than that required by the program teams to perform comprehensive workload integration, but would be tailored to provide information necessary for issue resolution. As guidance, the contractor shall submit a monthly report containing a summary identifying progress to date, variances to the planned schedule, causes for the variance, potential impacts and recommended corrective action to avoid schedule delays. Actual start and completion dates shall be reported. The analysis shall also identify potential programs

and a continuing assessment of the network critical path. Thresholds for impact reporting shall be identified on the DD Form 1423, CDRL.

The Execution IMP/IMS is also an extremely useful source of information that can be provided to outside organizations whose support is necessary for program continuation. These organizations may include Air Force, Congress, DoD, GAO, and the other DoD Services on joint programs. Other traditional sources of program status information such as Cost Performance Reports, deliveries, and financial tracking are valuable, but usually would not provide the current, detailed information that is available from the Execution IMP/IMS statusing. Further, as cited above, because of the level of integration inherent in the Execution IMP/IMS, it can be an invaluable tool in assessing the impact of funding cuts and other program iterations, with credible, consistent information.

Programs that have instituted an Execution IMP/IMS have used it as a key management tool that facilitates communication among the contractor teams and the government, both day-to-day and in support or regularly scheduled Program Management Reviews with the subcontractors.

3.2.2.5. Other Uses. When the Execution IMP/IMS is used as the baseline management tool for the day-to-day execution of the contract, it can be the source for other information required to satisfy program requirements. In other cases, especially in the financial area, the detailed IMS program performance information can be used as a supplement and a crosscheck to the data provided in the existing financial systems. The following are some areas where the IMP/IMS may be tied to other program requirements:

3.2.2.5.1. Contractor Performance Assessment Reports (CPAR). Currently, program offices must document CPARs for all contracts with a face value of $5 million or more to provide an objective evaluation of the contractor's performance on the contract. If the Execution IMP/IMS is used as a management tool, much of the information required to assess performance for the CPAR is readily obtainable. This information can be used as justification and substantiation for the CPAR.

3.2.2.5.2. Award Fee. If the contract has an Award Fee provision, the Execution IMP/IMS information can be used to support and substantiate the program office evaluation in the same manner as within the CPAR. Also, successful completion of IMP/IMS events and associated accomplishments or criteria in the IMP/IMS can be tied directly to Award Fee criteria. In some cases, the Award Fee periods have been correlated with the completion of the events in the IMP and IMS. Also, the common baseline provided by the Execution IMP/IMS can be effectively used to focus work efforts that are critical to the accomplishment of the program.

3.2.2.5.3. Earned Value Management System (EVMS). EVMS is a management tool to track costs and program schedule execution by the IPTs. There should be traceability between the data being collected and the schedule being used by the IPTs, or analysis of reporting variances will suffer. It is recommended that EVMS and IMS reflect the same WBS, schedule, and ideally, the same task. It is also recommended that both the EVMS data and the IMS activity be checked periodically by the responsible IPTs to ensure changes are consistently reflected in both.

3.2.2.6. Change Control Process. As indicated in earlier chapters, the Execution IMP formulated in the source selection (or in a sole source environment) process may require modifications during the performance of the contract. The contents of the IMS, unlike the IMP contents, are not contractually binding. The change process for the IMS, therefore, is less rigorous than the contractual

process needed to change the IMP, but no less important. Configuration control of the IMS must be in place and can be achieved by using a structured change process. Many companies already have existing policy statements that describe their process for maintaining configuration control over their scheduling processes. For some companies, however, this may need to be developed. For all programs, the change control process should be reviewed and tailored to meet any unique needs of the program. The following information and characteristics should be covered: The IMS changes control process would be clearly stated, to cover the following:

- The documented coordination and approval of IMS changes.

- The identification of the IPT responsible for performing the changes and maintaining configuration control.

- How the IMS changes are monitored and controlled.

- How the IMS revisions are published and distributed to program personnel.

The IMS should be established as the schedule baseline against which performance is measured. After the contract has been awarded, the IMS will become the schedule baseline for the program, and management will execute the program using this plan. Sometimes realities of program execution lead to a variation between planned progress and actual progress. Workarounds will have to occur to return to the program baseline approach. When this occurs, the adjusted plan should be shown in the IMS; however, the original IMS should be archived for reference. These "changes," or workarounds, should follow the documented IMS change process.

Chapter 4

GETTING HELP

4.1. As cited earlier, this AFMC IMP/IMS Guide is not the sole source of help while preparing an IMP and IMS or while preparing the IMP/IMS guidance for the Section L Instruction to Offerors of a Request for Proposals. There is an Acquisition Center of Excellence at HQ AFMC and at each product, logistics, and test center that is staffed with personnel knowledgeable of the IMP/IMS concepts and who have experience applying them. These offices are listed in **Table 4.1.** In addition, there are various reference documents and Internet websites that can be used to further your understanding of preparing and using the IMP and IMS. The reference documents are found in Appendix D to this Guide; **Table 4.2.** provides the links to available Internet websites.

Table 4.1. Acquisition Centers of Excellence Offices.

ACE Office	Base	DSN	Commercial
HQ AFMC/AE	Wright Patterson AFB	986-0850	937-656-0850
AAC/AE	Eglin AFB	872-7148	850-882-7180
AEDC/AE	Arnold AFS	340-4720	931-454-4720
AFFTC/AE	Edwards AFB	527-5686	661-277-5686
AFRL/AE	Wright Patterson AFB	986-9218	937-656-9218
ASC/AE	Wright Patterson AFB	785-5315	937-255-5315
ESC/AE	Hanscom AFB	478-7176	781-377-7176
MSG/AE	Wright Patterson AFB	986-2058	937-656-2058
HSW/AE	Brooks AFB	240-8476	210-536-8479
OC-ALC/AE	Tinker AFB	884-2791	405-734-2791
OO-ALC/AE	Hill AFB	777-7999	801-777-7999
SMC/AXD	Los Angeles AFB	833-2401	310-363-2401
WR-ALC/AE	Robins AFB	468-9303	478-926-9303

Reference Documents:

See **Attachment 5**

Websites: See **Table 4.2.**

Table 4.2. IMP/IMS Related Websites.

Website	Address	General Content	Remarks
AFMC IMP/IMS Guide	**Http:// www.afmc-pub.wpafb.af.mil/ HQ-AFMC/AE/docs/ IMP-IMSGuide.doc**	This guide	
Acquisition Knowledge Sharing System	**http://deskbook/dau.mil/jsp/ default.jsp**	Broad spectrum of acquisition information.	Current home of the DAU version of Deskbook.
ASC/PM's IMP/IMS	**https://www.aekm.wpafb.af.mil/ FoldrViewL.jsp?id=Folder Home.AEKM.1039722429397**	Includes training module and examples.	
Defense Acquisition University (DAU)	**http://www.dau.mil/default.asp**	Broad spectrum of acquisition information	
Legacy Defense Acquisition Deskbook	**http://desktop.dau.mil/ legacydeskbook.asp**	Broad spectrum of acquisition information as of Feb 2002.	Information and documents in the Legacy Deskbook are no longer maintained; last updated February 2002.

AFMC IMP/IMS Guide Point of Contact:

The point of contact for this guide is HQ AFMC/AE, Building 262, Wright-Patterson AFB OH 45433-7803, telephone 937-656-0850 or DSN 986-0850.

Robert P Lyons, Jr., Col, USAF
HQ AFMC Acquisition Center of Excellence

Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

Abbreviations and Acronyms

AAC—Air Armament Center

ACE—Acquisition Center of Excellence

AF—Actual Finish

AFMC—Air Force Materiel Command

ALC—Air Logistics Center

AMP—Avionics Modernization Program

APB—Acquisition Program Baseline

AS—Actual Start

ASC—Aeronautical Systems Center

BOE—Basis of Estimate

CDD—Capabilities Development Document

CDR—Critical Design Review

CDRL—Contract Data Requirements List

CI—Configuration Item

CLIN—Contract Line Item Number

CMP—Configuration Management Plan

COTS—Commercial-Off-The-Shelf

CPAR—Contractor Performance Assessment Report

CPM—Contract Performance Measure

DAL—Data Accession List

DID—Data Item Description

DoD—Department of Defense

DRFP—Draft Request for Proposal

DT&E—Development, Test and Evaluation

EDI—Electronic Data Interchange

EF—Early Finish

ENT—Entrance

ES—Early Start

ESC—Electronic Systems Center

EVMS—Earned Value Management System

EX—Exit

FCA—Functional Configuration Audit

FQT—Formal Qualification Test

FF—Finish to Finish

FS—Finish to Start

GFE—Government Furnished Equipment

H—High

IAW—In Accordance With

IMP—Integrated Master Plan

IMS—Integrated Master Schedule

IOC—Initial Operational Capability

IPPD—Integrated Product and Process Development

IPT—Integrated Product Team

ITO—Instructions to Offerors

KPP—Key Performance Parameters

LF—Late Finish

LOE—Level of Effort

LRIP—Low Rate Initial Production

LS—Late Start

M—Medium

MNS—Mission Needs Statement

NDI—Non-Developmental Item

NOCA—Notice of Contract Action

OFP—Operational Flight Program (software)

OCALC—Oklahoma City Air Logistics Center

OOALC—Ogden Air Logistics Center

ORD—Operational Requirements Document

OSD—Office of the Secretary of Defense

OT&E—Operational Test and Evaluation

PAC—Post-Award Conference

PCA—Physical Configuration Audit

PDM—Programmed Depot Maintenance

PDR—Preliminary Design Review

PERT —Program Evaluation and Review Technique

PMR—Program Management Review

PRR—Production Readiness Review

QT&E—Qualification Test and Evaluation

R&M—Reliability and Maintainability

RFP—Request for Proposal

ROM—Rough Order of Magnitude

SRA—Schedule Risk Assessment

SERD—Support Equipment Recommendation Data

SF—Start to Finish

SOO—Statement of Objectives

SOW—Statement of Work

SPO—System Program Office

SRA—Statistical Risk Analysis

SRD—System Requirements Document

SRR—System Requirements Review

SS—Start to Start

SSA—Source Selection Authority

TPM—Technical Performance Measure

TRR—Test Readiness Review

WBS—Work Breakdown Structure

WR-ALC—Warner Robins Air Logistics Center

Attachment 2

SAMPLE SOW STATEMENTS

Integrated Master Plan (IMP). The contractor shall manage the execution of the XYZ program/project using the IMP and it's associated IMS as day-to-day execution tools and to periodically assess progress in meeting program requirements. The IMP shall be maintained and shall be updated when it is deemed necessary to reflect changes to the ongoing program, subject to Procuring Activity approval. The contractor shall report on program/project progress in accordance with the IMP at each program management review, at selected technical reviews, and at other times at the government's request.

Integrated Master Schedule (IMS). The contractor shall revise their IMS, where necessary, to reflect the Contract IMP. They shall use it as a day-to-day execution tool and to periodically assess progress in meeting program requirements. The contractor shall maintain and update the IMS, when necessary, to reflect government approved changes in the Execution IMP, or changes in the contractor's detailed execution activities or schedule. The IMS shall include the activities of the prime contractor and their major subcontractors. All contractor schedule information delivered to the Government or presented at program reviews shall originate from the IMS. The contractor shall perform appropriate analyses of the IMS tasks and report potential or existing problem areas and recommend corrective actions to eliminate or reduce schedule impact. (CDRL XXXX, DI-MISC-81183, Integrated Master Schedule)

Attachment 3

SAMPLE SECTION L (INSTRUCTIONS TO OFFERORS) STATEMENTS

This attachment provides sample statements for use in Section L (Instructions to Offerors) of the RFP. For the samples shown it is assumed the RFP calls for a Contracts Volume and a Technical Volume

Contracts Volume

Since the IMP will be contractually incorporated, a logical place to ask for it in Section L is the Contractual Volume.

EXAMPLE

Section L Instructions

The offeror shall provide the following documents in Section J as part of the Model Contract:

a. Statement of Work

b. System Specification

c. Integrated Master Plan

d. Contract Work Breakdown Structure

Then the RFP can request the IMP in the appropriate section of the Contractual Volume.

EXAMPLE

Integrated Master Plan (IMP).

The Offeror shall provide an Execution IMP as part of their proposal submittal. The Offeror's proposed IMP shall be provided as an attachment (in Section J) to the Model Contract. For guidance in development of the IMP, the offerors shall use the AFMC IMP/IMS Guide dated ___ . The offerors shall then tailor that guidance as required for their particular approach. The following additional requirements apply to the XXX Execution IMP:

(Insert additional requirements IAW **paragraph 3.1.3.2.** of this guide)

Consideration: Again, there is no need to duplicate information from **Chapter 1**-**Chapter 3** of this guide in the RFP.

Technical Volume

Since the IMS represents all of the activities necessary to execute the program and illustrates how all of the activities are integrated, the logical place to ask for it in Section L is the Technical Volume, usually as an attachment.

EXAMPLE Section L Instructions:

Integrated Master Schedule (IMS)

The Offeror shall provide an Execution IMS as part of their proposal submittal. For guidance in development of the IMS, the offerors shall use the AFMC IMP/IMS Guide dated ___ . The offerors shall then tailor that guidance as required for their particular approach. The following additional requirements apply to the XXX Execution IMS:

(Insert additional requirements for the IMS IAW **paragraph 3.1.3.2.** of this guide)

Attachment 4

SAMPLE SECTION M (EVALUATION FACTORS FOR AWARD) STATEMENTS

Since the approach the offeror proposes should be reflected throughout the IMP and IMS, mention of the IMP and IMS should be included in the specific evaluation criteria to which they apply:

EXAMPLE A

An evaluation will be made of the offeror's Integrated Master Plan (IMP) and Integrated Master Schedule (IMS) as they reflect understanding of the program requirements and the soundness of approach to meeting those requirements.

EXAMPLE B

Technical or Product Area. Each offeror's technical approach will be evaluated using the System/Subsystem Specification, IMP (and its correlation to the IMS), and any proposed deviations to the SRD requirements as evidence of the offeror's understanding of the requirements specified in the RFP, of the soundness of the offeror's approach, and of a commitment to meeting those requirements. The technical area will be evaluated based on the following three equally weighted factors below:

Factor T.1. (Description)

Factor T.2 (Description)

Factor T.3 (Description)

EXAMPLE C

Schedule evaluation will be based on ……………………………..

EXAMPLE D

An evaluation will be made of the offeror's Integrated Master Plan (IMP) and Integrated Master Schedule (IMS) as they incorporate and reflect the offeror's understanding of the requirements and soundness of the approaches described in the offeror's proposal.

Attachment 5

REFERENCE DOCUMENTS (WITH HYPERLINKS)

Department of Defense, cited January 1997, DoD Guide to Integrated Product and Process

Development (Version 1.0), **http://www.acq.osd.mil/te/survey/table_of_contents.html**.

MIL-HDBK-881B, Work Breakdown Structures for Defense Material Items, 2 January 1998:
http://www.acq.osd.mil/pm/newpolicy/wbs/wbs.html.

DSMC Scheduling Guide for Program Managers: **http://www.dau.mil/pubs/gdbks/schedulinguide.pdf**

Glossary of Defense Acquisition Acronyms and Terms (2001):
http://www.dau.mil/pubs/glossary/glossary.pdf

Attachment 6

SAMPLE IMP/IMS

The following examples illustrate a generic IMP and IMS for a notional "Widget" Program. In this example, the Widget program consists of taking an existing contractor "Widget" design (Version1), modifying the design for another mission (Version 1a), and taking both the existing and modified designs through First Article Test, Initial Production, and Delivery. For the IMP, the sample provides only an "action verb" dictionary and a table of events, accomplishments and criteria, with no IMP Narratives. For the Sample IMS, the sample provides a tabular listing of all IMS activities, along with durations, start finish dates and predecessors. The intent of these examples is not to present a "recommended" IMP/IMS, as an IMP/IMS could be created with significantly different events, accomplishments and criteria. The intent is to illustrate the hierarchical structure and relationship of events, accomplishments, criteria and tasks.

In this file, four IPTs are referenced for the sample program. They are: Program IPT (PROG), System Engineering, Integration and Test IPT (SEIT), Widget Design and Manufacturing IPT (WDM) and Support IPT (SUPP).

Table A6.1. Sample IMP.

Activity #	**Event** **Accomplishment** **Criteria**	**WBS** **REF**
A	Event A - Post Award Conference/Baseline Design Review (PA/BDR)	-
A01	Management Planning Reviewed	-
A01a	Program Organization Established	1.2.1
A01b	Initial Configuration Management Planning Complete	1.2.2, 1.2.3
A01c	Program Schedule Reviewed	1.2.1
A01d	Risk Management Program Reviewed	1.2.1
A02	Baseline Design Reviewed	-
A02a	Requirements Baseline Complete	1.3.1
A02b	Review Of Existing Baseline Engineering/Kit Drawings Complete	1.1.1
A03	Post-Award Conference/Baseline Design Review Conducted	-
A03a	PA/BDR Meeting Conducted	1.2.1
A03b	PA/BDR Minutes And Action Items Generated	1.2.1
B	Event B - Final Design Review (FDR)	-
B01	Design Definition Complete	-
B01a	Design Deltas To Baseline Identified	1.3.1
B01b	Drawings Complete (Baseline & Deltas)	1.1.1, 1.3.1
B02	System Performance Assessment Reviewed	-

Activity #	Event Accomplishment Criteria	WBS REF
B02a	Initial Weight Analysis Complete	1.3.1
B02b	Electrical Current Consumption Report Complete	1.3.1
B02c	Initial Reliability, Maintainability, & Availability Predictions Complete	1.3.3
B02d	System Safety Hazard Analysis Complete	1.3.4
B03	Initial Test And Manufacturing Planning Reviewed	-
B03a	Acceptance Test Plan Complete	1.3.2
B03b	Manufacturing Plan Complete	1.2.4
B04	Final Design review (FDR) Conducted	-
B04a	PA/BDR Minutes and Action Item Closure Plan Finalized	1.2.1
B04b	FDR Meeting Conducted	1.3.1
B04c	FDR Minutes and Action Items Generated	1.3.1
C	Event C - Test Readiness Review/Production Readiness Review (TRR/PRR)	-
C01	First Article Build, Assembly And Inspection Complete	-
C01a	First Article Material Purchase And Build Complete	1.2.2, 1.1.2.1
C01b	First Article Assembly And Inspection/Test Complete	1.1.2.1, 1.1.2.3
C02	Support And Testing Equipment Available	-
C02a	Equipment Identified And Acquired	1.2.5
C03	Test Planning Complete	-
C03a	First Article Qualification Test Plan/Procedures (FAQTP) Available	1.3.2
C03b	Acceptance Test Procedures (ATP) Available	1.3.2
C04	Manufacturing Planning Complete	-
C04a	Manufacturing Plan Update Complete	1.2.4
C04b	Facilities Planning Complete	1.2.4
C04c	Quality Improvement Plan Complete	1.3.5
C04d	Initial Quality Conformance Sampling Inspection Results Available	1.3.5
C05	TRR/PRR Conducted	-
C05a	FDR Minutes and Action Item Closure Plan Finalized	1.3.1
C05b	TRR/PRR Meeting Conducted	1.3.2
C05c	TRR/ PRR Minutes and Action Items Generated	1.3.2
D	Event D - Functional/Physical Configuration Audit (FCA/PCA)	-

Activity #	Event **Accomplishment** Criteria	WBS REF
D01	First Article Test (FAT) Complete	-
D01a	FAT Conducted	1.1.2.1, 1.3.2
D01b	First Article Qualification Report Complete	1.3.2
D02	R&M Qualification Reports Complete	-
D02a	Final Reliability Report Complete	1.3.3
D02b	Maintainability Report Complete	1.3.3
D03	FCA/PCA Conducted	-
D03a	TRR/PRR Minutes and Action Item Closure Plan Finalized	1.3.2
D03b	Data Requirements Completed	1.2.2
D03c	FCA/PCA Meeting Conducted	1.2.2
D03d	FCA/PCA Minutes and Action Items Generated	1.2.2
E	Event E - Initial Production Complete (IPC)	
E01	Version 1 Kit Production And Delivery Complete	-
E01a	Version 1 Subassemblies Complete	1.1.2.2, 1.2.2
E01b	Version 1 Assembly/Integration/Test Complete	1.1.2.2
E01c	Version 1 Packaging And Delivery Complete	1.1.2.2
E02	Version 1a Kit Production And Delivery Complete (15)	-
E02a	Version 1a Subassemblies Complete	1.1.2.4, 1.2.2
E02b	Version 1a Assembly/Integration/Test Complete	1.1.2.4
E02c	Version 1a Packaging And Delivery Complete	1.1.2.4

Table A6.2. Sample Action Verb Dictionary

Verb	Definition
Acquired	Procured and/or fabricated and available
Analysis/ Analyzed	The subject parameter(s) has been technically evaluated through equations, charts, simulations, prototype testing, reduced data, etc.
Approved	The subject item, data, or document has been submitted to the government and the government has notified the contractor that it is acceptable. For some data items, it is specified that no response constitutes approval.
Available	The subject item is in place/The subject process is operational/The subject data or document has been added to the Data Accession List.
Awarded	Contract /Subcontract is authorized to begin

Verb	Definition
Complete (d)	The item or action has been prepared or accomplished and is available for use and/or review.
Concurrence	The government has expressed its agreement with the contractors proposed design, approach, or plan as documented in either formal correspondence or meeting minutes, presentations, etc.
Conducted	Review or Meeting is held physically and minutes and action plans are generated/Test or demonstration is performed.
Deficiencies corrected	New designs and/or procedures to correct documented deficiencies to requirements have been identified and incorporated into the baseline documentation. May include hardware fixes/retrofits.
Defined	Identified, analyzed, and documented
Delivered	Distributed or transferred to the government (by DD 250, if applicable).
Demonstrated	Shown to be acceptable by test and/or production/field application.
Developed	Created through analysis and documented.
Documented	Placed in a verifiable form (written/recorded/electronically captured).
Drafted	An initial version (usually of a document) has been created which will require updating to finalize.
Ended	Complete; over
Established	The subject item has been set and documented.
Finalized	Last set of planned revisions has been made or final approval has been obtained.
Generated	Required information has been placed into written form.
Identified	Made known and documented.
Implemented	Put in place and/or begun
Initiated	Begun
In-Place	At the physical location needed, ready to use or to perform.
Obtained	Received and documented.
Ordered	Purchase Orders completed
Met	Agreement reached that requirements have been satisfied
Prepared	Information placed into written form.
Provided	Given to in some traceable form (paper, briefing, electronically, etc).
Published	Distributed to team members, either formally (by CDRL), or placement on Data Accession List.
Received	Shipped or delivered item is physically in possession of intended receiver
Refined	Next level of detail has been added or updates made.
Reviewed	Presented for examination to determine status and discuss issues.
Submitted	Formally submitted to the government.

Verb	Definition
Trained	Type I training course completed
Updated	Revisions made to documents, metrics, and cost estimates to incorporate contractor and/or government changes
Validated	Subject item, data or document has been tested for accuracy by the contractor.
Verified	Substantiated by analysis and/or test performed independently of builder/ preparer.
Written	Created but not yet published or submitted.

Figure A6.1. Sample IMS.

ID	Activity#	Task Name	Dur	Start	Finis	Predecessors
1		**Widget Program**	369	4/15/0	9/10/0	
2		Contract Award	1 d	4/15/0	4/15/0	
3						
4		**Event A - Post Award Conference/Baselir**	1 d	5/14/0	5/14/0	41FF
5		**Event B - Final Design Review**	1 d	8/19/0	8/19/0	84FF
6		**Event C - Test Readiness Review/Produc**	1 d	12/2/0	12/2/0	135FF
7		**Event D - Functional/Physical Configurati**	1 d	3/16/0	3/16/0	164FF
8		**Event E - Initial Production Complete**	1 d	9/10/0	9/10/0	170FF
9						
10		**Event**	1 d	4/15/0	4/15/0	
11		**Accomplishment**	1 d	4/15/0	4/15/0	
12		**Criteria**	1 d	4/15/0	4/15/0	
13		Task	1 d	4/15/0	4/15/0	
14	A	**Event A - Post Award Conference/Baselir**	22 d	4/16/0	5/15/0	
15	A01	**Management Planning Reviewed**	17 d	4/16/0	5/8/03	
16	A01a	**Program Organization Established**	10 d	4/16/0	4/29/0	
17	A01a01-1	Identify contractor team members	10 d	4/16/0	4/29/0	2
18	A01a02-g	Identify government team members	10 d	4/16/0	4/29/0	2
19	A01b	**Initial Configuration Management Pl:**	17 d	4/16/0	5/8/03	
20	A01b01-1	Prepare Configuration Management P	15 d	4/16/0	5/6/0:	2
21	A01b02-1	Enter Configuration Management Plar	2 d	5/7/0:	5/8/0:	20
22	A01b03-1	Establish Configuration Management	5 d	4/16/0	4/22/0	2
23	A01c	**Program Milestone Schedule Reviev**	10 d	4/16/0	4/29/0	
24	A01c01-1	Prepare Summary schedule for review	5 d	4/16/0	4/22/0	2
25	A01c02-1	Review and discuss milestone schedu	5 d	4/23/0	4/29/0	24
26	A01d	**Risk Management Program Reviewe**	15 d	4/16/0	5/6/03	
27	A01d01-1	Document initial risk assessments	10 d	4/16/0	4/29/0	2
28	A01d02-1	Review Risk Mitigation Activities	5 d	4/30/0	5/6/0:	27
29	A02	**Baseline Design Reviewed**	20 d	4/16/0	5/13/0	
30	A02a	**Requirements Baseline Complete**	15 d	4/16/0	5/6/03	
31	A02a01-1	Review System Performance Specifica	10 d	4/16/0	4/29/0	2
32	A02a02-1	Review System Performance Verificati	5 d	4/30/0	5/6/0:	31
33	A02b	**Review of Existing Baseline Enginee**	20 d	4/16/0	5/13/0	
34	A02b01-1	Review electrical design	15 d	4/16/0	5/6/0:	2
35	A02b02-1	Review mechanical design	15 d	4/16/0	5/6/0:	2
36	A02b03-1	Review interface design	15 d	4/16/0	5/6/0:	2
37	A02b04-1	Identify existing drawing shortfalls	20 d	4/16/0	5/13/0	34SS,35SS,36SS
38	A02b05-1	Conduct Drawing Format Meeting	2 d	5/7/0:	5/8/0:	34,35,36
39	A03	**Post-Award Conference/Baseline Desi**	2 d	5/14/0	5/15/0	
40	A03a	**PA/BDR Meeting Conducted**	1 d	5/14/0	5/14/0	
41	A03a01-1	Conduct PA/BDR	1 d	5/14/0	5/14/0	37,38,17,18,21,22,25,28,3
42	A03b	**PA/BDR Minutes and Action Items G**	1 d	5/15/0	5/15/0	
43	A03b01-1	Prepare 1st draft of PA/BDR minutes	1 d	5/15/0	5/15/0	41
44	A03b02-1	Identify PA/BDR Action Items	1 d	5/15/0	5/15/0	41
45	B	**Event B - Final Design Review**	92 d	4/16/0	8/21/0	
46	B01	**Design Definition Complete**	88 d	4/16/0	8/15/0	
47	B01a	**Design Deltas to Baseline Identified**	88 d	4/16/0	8/15/0	
48	B01a01-1	Perform requirements delta analysis	22 d	4/16/0	5/15/0	2
49	B01a02-1	Perform engineering design for deltas	66 d	5/16/0	8/15/0	23,44,48

Figure A6.2. Sample IMS.

ID	Activity#	Task Name	Dur	Start	Finis	Predecessors
50	B01b	**Drawings Complete (Baseline & Delta**	43 c	4/30/0	6/27/C	
51	B01b01-1	Preparation of source control and manu	33 c	4/30/C	6/13/C	34SS+10 d,35SS+10 d,36
52	B01b02-1	Review by Engineering Manager	10 c	6/16/C	6/27/C	51
53	B02	**System Performance Assessment Revie**	51 c	4/30/0	7/9/0:	
54	B02a	**Initial Weight Analysis Complete**	17 c	6/17/0	7/9/0:	
55	B02a01-1	Perform calculations and analysis	15 c	6/17/C	7/7/0:	49SS+22 d
56	B02a02-1	Internal review	2 d	7/8/0:	7/9/0:	55
57	B02b	**Electrical Current Consumption Repo**	45 c	5/7/0:	7/8/0:	
58	B02b01-1	Identify electrical equipment	33 c	5/7/0:	6/20/C	34
59	B02b02-1	Calculate electrical current consumptio	10 c	6/23/C	7/4/0:	58
60	B02b03-1	Internal review	2 d	7/7/0:	7/8/0:	59
61	B02c	**Initial Reliability, Maintainability, & Av**	49 c	4/30/0	7/7/0:	
62	B02c01-1	Prepare initial reliability prediction	44 c	4/30/C	6/30/C	51SS
63	B02c02-1	Prepare initial maintainability prediction	44 c	4/30/C	6/30/C	51SS
64	B02c03-1	Prepare initial availability prediction	3 d	7/1/0:	7/3/0:	62,63
65	B02c04-1	Internal review	2 d	7/4/0:	7/7/0:	64
66	B02d	**System Safety Hazard Analysis Comple**	49 c	4/30/0	7/7/0:	
67	B02d01-1	Perform hazard identification / risk asse	44 c	4/30/C	6/30/C	51SS
68	B02d02-1	Identify hazard elimination / risk reducti	22 c	5/30/C	6/30/C	67SS+22 d
69	B02d03-1	Prepare safety assessment report	5 d	6/27/C	7/3/0:	68SS+20 d
70	B02d04-1	Internal review	2 d	7/4/0:	7/7/0:	69
71	B03	**Initial Test and Manufacturing Planning**	49 c	4/16/0	6/23/C	
72	B03a	**Acceptance Test Plan Complete**	27 c	5/16/0	6/23/C	
73	B03a01-1	Prepare Acceptance Test Plan	22 c	5/16/C	6/16/C	44
74	B03a02-1	Accomplish Test Plan internal review	3 d	6/17/C	6/19/C	73
75	B03a03-1	Submit Acceptance Test Plan for appro	2 d	6/20/C	6/23/C	74
76	B03b	**Manufacturing Plan Complete**	32 c	4/16/0	5/29/C	
77	B03b01-1	Detail the milestone plan for transition t	10 c	4/16/C	4/29/C	2
78	B03b02-1	Prepare Manufacturing plan for inclusic	22 c	4/30/C	5/29/C	77
79	B04	**Final Design Review (FDR) Conducted**	70 c	5/16/0	8/21/C	
80	B04a	**PA/BDR Minutes and Action Item Clos**	44 c	5/16/0	7/16/C	
81	B04a01-1	Review and submit PA/BDR minutes	2 d	5/16/C	5/19/C	43
82	B04a02-1	Generate and review PA/BDR Action Ite	44 c	5/16/C	7/16/C	44
83	B04b	**FDR Meeting Conducted**	2 d	8/18/0	8/19/C	
84	B04b01-1	Conduct FDR Meeting	2 d	8/18/C	8/19/C	49,65,70,56,60,78,82
85	B04c	**FDR Minutes and Action Items Genera**	2 d	8/20/0	8/21/C	
86	B04c01-1	Prepare 1st draft of PDR minutes	2 d	8/20/C	8/21/C	84
87	B04c02-1	Identify PDR Action Items	2 d	8/20/C	8/21/C	84
88	C	**Event C - Test Readiness Review/Product**	145	5/16/0	12/4/C	
89	C01	**First Article Build, Assembly and Inspec**	142	5/16/0	12/1/C	
90	C01a	**First Article Material Purchase and Bu**	112	5/16/0	10/20/	
91	C01a01-1	Material Procurement (existing design -	88 c	5/16/C	9/16/C	44
92	C01a02-1	Material Procurement (delta design - Ve	44 c	8/20/C	10/20/	84
93	C01a03-1	Fabricate in-house parts (existing desic	66 c	5/16/C	8/15/C	44
94	C01a04-1	Fabricate in-house parts (delta design -	44 c	8/20/C	10/20/	84
95	C01b	**First Article Assembly and Inspection/**	54 c	9/17/0	12/1/C	
96	C01b01-1	Assemble first article (Version 1)	20 c	9/17/C	10/14/C	91,93
97	C01b02-1	Inspect/test First Article Version 1)	10 c	10/15/	10/28/	96,104
98	C01b03-1	Assemble first article (Version 1a)	20 c	10/21/	11/17/	92,94
99	C01b04-1	Inspect/test First Article (Version 1a)	10 c	11/18/	12/1/C	98

Figure A6.3. Sample IMS.

ID	Activity#	Task Name	Dur	Start	Finis	Predecessors
10	C02	**Support and Testing Equipment Avail**	37 c	8/20/(	10/9/(	
10	C02a	**Equipment Identified and Acquired**	37 c	8/20/(	10/9/(	
10	C02a01-	Identify equipment required	5 d	8/20/(	8/26/(	84
10	C02a02-	Complete evaluation of in-house sup	10 c	8/27/(	9/9/0	102
10	C02a03-	Acquire/lease additional equipment if	22 c	9/10/(	10/9/(	103
10	C03	**Test Planning complete**	97 c	6/24/(	11/5/(	
10	C03a	**First Article Qualification Test Plan/**	56 c	8/20/(	11/5/(	
10	C03a01-	Prepare FAQTP	44 c	8/20/(	10/20.	84
10	C03a02-	Accomplish FAQTP internal review	10 c	10/21.	11/3/(	107
10	C03a03-	Submit FAQTP for approval (if applic	2 d	11/4/(	11/5/(	108
11	C03b	**Acceptance Test Procedures (ATP)**	56 c	6/24/(	9/9/0	
11	C03b01-	Govt approve Acceptance test plan	22 c	6/24/(	7/23/(	75
11	C03b02-	Prepare ATP	22 c	7/24/(	8/22/(	111
11	C03b03-	Accomplish ATP internal review	10 c	8/25/(	9/5/0	112
11	C03b04-	Submit ATP to government	2 d	9/8/0	9/9/0	113
11	C04	**Manufacturing Planning Complete**	72 c	8/20/(	11/27.	
11	C04a	**Manufacturing Plan Update Comple**	12 c	8/20/(	9/4/0	
11	C04a01-	Prepare Manufacturing Plan updates	10 c	8/20/(	9/2/0	84
11	C04a02-	Place revised manufacturing plan on	2 d	9/3/0	9/4/0	117
11	C04b	**Facilities Planning Complete**	70 c	8/20/(	11/25.	
12	C04b01-	Identify required facilities	33 c	8/20/(	10/3/(	84
12	C04c02-	Put in place required tooling	60 c	9/3/0	11/25.	120SS+10 d
12	C04c	**Quality Improvement Plan Complete**	55 c	8/20/(	11/4/(	
12	C04c01-	Review existing Quality Improvemen	22 c	8/20/(	9/18/(	84
12	C04c02-	Tailor existing Quality Improvement F	33 c	9/19/(	11/4/(	123
12	C04d	**Initial Quality Conformance Samplin**	50 c	9/19/(	11/27.	
12	C04d01-	Prepare Sampling plan per ANSI/AS(	20 c	9/19/(	10/16.	124SS
12	C04d02-	Select and test/inspect First Article s	25 c	10/17.	11/20.	91SS+22 d,93SS+10 d,'
12	C04d03-	Document results	5 d	11/21.	11/27.	127
12	C05	**TRR/PRR Conducted**	75 c	8/22/(	12/4/(	
13	C05a	**FDR Minutes and Action Item Closu**	44 c	8/22/(	10/22.	
13	C05a01-	Mgt review of FDR minutes	5 d	8/22/(	8/28/(	86
13	C05a02-	Submit FDR minutes	2 d	8/29/(	9/1/0	131
13	C05a03-	Generate FDR Action Item Closure F	44 c	8/22/(	10/22.	87
13	C05b	**TRR/PRR Meeting Conducted**	1 d	12/2/(	12/2/(	
13	C05b01-	Conduct TRR/PRR	1 d	12/2/(	12/2/(	97,103,113,121,128,99,1
13	C05c	**TRR/ PRR Minutes and Action Items**	2 d	12/3/(	12/4/(	
13	C05c01-	Prepare 1st draft of TRR/PRR minut	2 d	12/3/(	12/4/(	135
13	C05c02-	Identify TRR/PRR Action Items	2 d	12/3/(	12/4/(	135
13	D	**Event D - Functional/Physical Configura**	151	8/20/(	3/17/(	
14	D01	**First Article Test (FAT) Complete**	48 c	12/2/(	2/5/0	
14	D01a	**FAT Conducted**	26 c	12/2/(	1/6/0	
14	D01a01-	First articles shipped to ____	4 d	12/2/(	12/5/(	97,99
14	D01a02-	Conduct first articles acceptance tes	22 c	12/8/(	1/6/0	142,138
14	D01b	**First Article Qualification report con**	48 c	12/2/(	2/5/0	
14	D01b01-	Create First Article Inspection report	10 c	12/2/(	12/15.	97,99
14	D01b02-	Prepare _____ Compliance Data	22 c	1/7/0	2/5/0	84,143
14	D01b03-	Create Qualification by Similiarity rep	22 c	12/16.	1/14/(	145

Figure A6.4. Sample IMS.

ID	Activity#	Task Name	Dur	Start	Finis|	Predecessors
14{	D02	**R&M Qualification Reports Complete**	88 c	8/20/0	12/19/	
14{	D02a	**Final Reliability Report Complete**	88 c	8/20/0	12/19/	
15(	D02a01-1	Perform relilability analysis	44 c	8/20/0	10/20/	84
15'	D02a02-1	Prepare final Reliability Report	44 c	10/21/	12/19/	150
15.	D02b	**Maintainability Report Complete**	88 c	8/20/0	12/19/	
15:	D02b01-1	Perform maintainability analysis	44 c	8/20/0	10/20/	84
15·	D02b02-1	Prepare final Maintainability Report	44 c	10/21/	12/19/	153
15!	D03	**FCA/PCA Conducted**	74 c	12/5/0	3/17/0	
15(	D03a	**TRR/PRR Minutes and Action Item Clos**	48 c	12/5/0	2/10/0	
15.	D03a01-1	Mgt review ofTRR/PRR minutes	2 d	12/5/0	12/8/C	137
15(	D03a02-1	Submit TRR/PRR minutes	2 d	12/9/0	12/10/	157
15!	D03a03-1	Generate TRR/PRR Action Item Closure	44 c	12/11/	2/10/C	138,158
16(	D03b	**Data Requirements Completed**	25 c	2/6/0·	3/11/0	
16	D03b01-1	Gather documents for PCA/FCA	5 d	2/6/0·	2/12/C	144,145,146,147
16:	D03b02-1	Government review PCA/FCA materials	15 c	2/20/0	3/11/C	161SS+10 d
16:	D03c	**FCA/PCA Meeting Conducted**	3 d	3/12/0	3/16/0	
16·	D03c01-1	Conduct FCA/PCA Meeting	3 d	3/12/0	3/16/C	162,151,154,159
16!	D03c02-1	Review and approve Functional Baselin	3 d	3/12/0	3/16/C	164SS
16(	D03c03-1	Review and approve Physical Baseline	3 d	3/12/0	3/16/C	165SS
16.	D03d	**FCA/PCA Minutes and Action Items Ge**	1 d	3/17/0	3/17/0	
16(	D03d01-1	Prepare 1st draft of FCA/PCA minutes	1 d	3/17/0	3/17/C	166,164,165
16!	D03d02-1	Identify FCA/PCA Action Items	1 d	3/17/0	3/17/C	164,166,165
17(	E	**Event E - Initial Production Complete (IPC)**	127	3/18/0	9/10/0	
17	E01	**Version 1 Kit Production and Delivery Co**	127	3/18/0	9/10/0	
17:	E01a	**Version 1 Subassemblies Complete**	85 c	3/18/0	7/14/0	
17:	E01a01-1	Generate bill of material	5 d	3/18/0	3/24/C	168,169
17·	E01a02-1	Generate operation/routing sheets	5 d	3/18/0	3/24/C	168,169
17!	E01a03-1	Order components/subassemblies and I	10 c	3/25/0	4/7/0·	173,174
17(	E01a04-1	Receive raw material	44 c	4/22/0	6/22/C	175FS+10 d
17.	E01a05-1	Fabricate in-house components/subass	55 c	4/29/0	7/14/C	176SS+5 d
17(	E01a06-1	Receive purchased components/subass	44 c	5/10/0	7/8/0·	175FS+22 d
17!	E01b	**Version 1 Assembly/Integration/Test Cc**	68 c	5/31/0	9/1/0·	
18(	E01b01-1	Assemble/integrate Version 1 Kits	66 c	5/31/0	8/30/C	177SS+22 d,178SS+5 d
18	E01b02-1	Test Version 1 Kits	66 c	6/2/0·	9/1/0·	180SS+2 d
18.	E01c	**Version 1 Packaging and Delivery Con**	72 c	6/3/0·	9/10/0	
18:	E01c01-1	Package Version 1 kits	66 c	6/3/0·	9/2/0·	181SS+1 d
18·	E01c02-1	Ship Version 1 Kits	71 c	6/4/0·	9/10/C	183SS+1 d
18!	E02	**Version 1a Kit Production and Delivery C**	127	3/18/0	9/10/0	
18(	E02a	**Version 1a Subassemblies Complete**	85 c	3/18/0	7/14/0	
18.	E02a01-1	Generate bill of material	5 d	3/18/0	3/24/C	168,169
18(	E02a02-1	Generate operation/routing sheets	5 d	3/18/0	3/24/C	168,169
18!	E02a03-1	Order components/subassemblies and I	10 c	3/25/0	4/7/0·	187,188
19(	E02a04-1	Receive raw material	44 c	4/22/0	6/22/C	189FS+10 d
19	E02a05-1	Fabricate in-house components/subass	55 c	4/29/0	7/14/C	190SS+5 d
19.	E02a06-1	Receive purchased components/subass	44 c	5/10/0	7/8/0·	189FS+22 d
19:	E02b	**Version 1a Assembly/Integration/Test C**	68 c	5/31/0	9/1/0·	
19·	E02b01-1	Assemble/integrate Version 1a Kits	66 c	5/31/0	8/30/C	191SS+22 d,192SS+5 d
19!	E02b02-1	Test Version 1a Kits	66 c	6/2/0·	9/1/0·	194SS+2 d
19(	E02c	**Version 1a Packaging and Delivery Co**	72 c	6/3/0·	9/10/0	
19.	E02c01-1	Package Version 1a kits	66 c	6/3/0·	9/2/0·	195SS+1 d
19!	E02c02-1	Ship Version 1a Kits	71 c	6/4/0·	9/10/C	197SS+1 d